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ORIGINAL ARTICLES

MISCARRIAGE: ITS CAUSES, DIAGNOSIS AND TREATMENT

BY JOHN ROCK, M.D.

CAUSES

THE terms abortion and miscarriage have so long been identified in common speech that any attempt to distinguish between them leads rather to confusion than lucidity. I shall use either term to mean the termination of pregnancy before the fetus is viable; i. e., up to the end of the 28th week after the last regular menstrual flow. Delivery after that time and before term is properly called premature birth. Not even the lay-man can doubt that miscarriage is frequent, even disregarding those abortions actively induced. Dependable statistics vary from Huntington's[3] 10% of pregnancies in a high class private practice, to Craigin's 38% in a similar series. Probably in general about one out of every four pregnancies ends prematurely. Multiparae are more susceptible than primiparae. Age of either partner, with its diminished physical efficiency in general, and damage wrought in the female genital apparatus by previous pregnancies probably effect this.

Until the very recent application of embryology to the study of abortions, the attributed causes of this social catastrophe were infinite. The very frequency of its occurrence has led to its association with almost every experience common to the daily life of pregnant women. Active trauma, as overwork, athletic exertion, high reaching; or passive trauma, as from blows, falls, excessive coitus, automobile riding—usually impresses the patient who, soon after the trauma, miscarries; so that there is naturally formed an association between the two events. Unpleasant emotional shocks are especially impressive; and to sudden grief—as from the death of a loved one, or to fear—as from an explosion, a fire in the house, or runaway horses, is usually attributed the subsequent mishap. Reynolds[42] cites the case of habitual abortion cured by the patient foregoing concerts during pregnancy, music having had a distinct emotional effect combined with noticeable pelvic sensations.

The following notes are selected from a report of the New York Department of Labor, on "The Relation of Trauma to Uterine Bleeding and Pregnancy", by Dr. Kurzrok[7]. He says, "Contrary to the popular belief, the pregnant uterus is not very responsive to external influence. Large statistics show that operations on the genital organs during pregnancy produce abortion in less than 25% of the cases, and this includes operations on the uterus proper (such as myomectomy, amputation of the cervix, etc.)." He says further on, "It is interesting to note that train wrecks with their concomitant extensive psychic trauma rarely ever interfere with pregnancy." After discussing the occurrence of miscarriage following direct injury to the uterus, such as gun shot wounds, contusions to the abdomen, etc., he says, "A fourth type of injury to the pregnant uterus is that resulting from increased intra-abdominal pressure, as would result from severe lifting or straining. Such an accident rarely terminates pregnancy. Usually in such cases, if the fetus and placenta are examined, there will be found inflammatory and degenerative change in them indicating previous death or disease. A macroscopic and microscopic examination of the products of conception is necessary to make sure that the fetus was not dead previous to the injury, the trauma being merely the active force in expelling the uterine contents."

Embryological studies made on the products of miscarriage, first in other mammals and more recently in man, have led us to a very conservative attitude towards the ordinary environmental causes hitherto considered likely. As director of the Department of Embryology of the Carnegie Institute in Washington, Streeter[34], who has continued valuable studies in pathology begun by his predecessor, Mall, says, ". . . we have partially come around to see . . . that a large number of abortions must be attributed to defective germ-plasm."

Huntington[3], of Boston, has afforded some interesting statistics by accepting the co-operation of the Carnegie Institute in studying the miscarriages in his private practice. Out of 398 successive private cases, he had 39, or almost exactly 10%, miscarriages. He says: "21 of these were reported as definitely due to defective germ-plasm. Three were probably due to

defective germ-plasm. One was due either to defective germ-plasm or arrested development due to extreme retroversion. One was due to death of the fetus caused by extreme fibroid degeneration of the uterus. One due to degeneration of fetal tissue apparently caused by nephritis." Twelve fetal tissues were apparently living and normal at the time of the abortion. The twelve are further accounted for. "One was immediately after appendectomy with drainage. One D. & C. for continued bleeding. One followed rupture of amniotic sac by artificial means. Two placenta praevia. Three therapeutic abortions. Four unexplained." Out of 39 cases of miscarriage, then, only four could have been caused by any of the manifold incidents formerly considered dangerous to pregnancy. Thus, considering the causes of miscarriage, it is to be noted that of the above series, 70% of the fetuses were dead before the miscarriage occurred. In 20% more, the cases were not accidental. In only 10% was the catastrophe possibly due to a vicarious trauma or mental shock, so commonly considered dangerous.

To prove, however, that the environmental incident, which accompanied or immediately preceded the miscarriage, is only the inciting cause of premature emptying of the uterus, and not at all the original cause of the death of the fetus, offers but negative evidence as to the cause of abortion. If the death of the fetus is due to a defective zygote[32] or of germ-plasm[34], whence the defect? If it is due to diseased endometrium, as Mall taught, whence the disease? The defect in the zygote may be due to a preexistent defect in either gamete, or perhaps, who knows, to incompatibility of the two. Of the two gametes, the spermatozoon has frequently been adjudged guilty, and lately Macomber[4] suggests the probability of "eggs of low vitality", as Jones[37], many years ago, decided on the frequency of "diseased ova." Meyer[33] quotes Costi as believing as far back as 1896 that all abortions between the eighth and tenth weeks were due to "defects inherent in the ovum." This attitude is today of course untenable.

Many recent studies of sterility in animals demonstrate the close relation between abortion and apparent sterility, just as Macomber[4] working with rats has shown that, under certain conditions in these animals, what was formerly considered sterility is really only a high intra-uterine death rate among a practically normal number of embryos. Reynolds and Macomber[42] have long taught that sterility had best be considered as diminished fertility, and the attitude is definitely supported by such work as Robinson[32] has done with horses and ferrets, and Corner[31] has done with pigs. Their animals have demonstrated that the absence of progeny may many times be due, not to a failure of conception, but to a high intra-uterine fetal mortality. When this happens in man miscarriage is the normal result, missed abortion being comparatively rare. Such studies, then, tend to identify the attributed causes of sterility with those of miscarriage. Which of these causes will be shown to act by attacking the gamete directly, to render it defective but not quite incapable of combining; which, by attacking the embryo in any of its parts; and which by destroying the ability of the uterus to harbor or to nourish the growing fetus, we have yet to know.

Some progress, however, has been made. Most of the older suspected causes of abortion can be immediately placed as acting through the uterus, but as we have seen, they account for but a small percentage. By them the uterus is rendered incapable of harboring the growing fetus, or its physiology is so far interfered with that the fetus is deprived of its nourishment, proceeds to die, and is then extruded as a foreign body. Malformation and malposition of the uterus, extensive laceration, and newgrowths, may be effective in the former of these two ways. In such cases the fetus is often alive when born. Into this group of causes comes also emotional upset which, probably by endocrine disturbance, induces the uterus to proceed as in normal labor. Intense fright is probably the commonest of these destructive emotions. Whether endocrinopathy alone can cause abortion we do not know. It is conceivable, for pituitary extract undoubtedly stimulates the uterus to contract, if exhibited during labor or immediately after labor, though there is much doubt about its effect on the uterus at any other time. Inflammatory disease of the endometrium, whether chronic, or acute and merely part of an infection primary elsewhere in the maternal body, is doubtless frequently the underlying cause of intra-uterine death. Syphilis, of course, has a well known and long established reputation as an abortifacient, though Williams[1] questions its efficiency during the first half of pregnancy. In its presence endarteritis of the endometrium is found, thus explaining some cases as practical starvation or suffocation of the embryo whose vitality is perhaps already lessened by weakened gametes. That the spirochaete sometimes passes over directly, and the fetus dies of its own overwhelming infection, is clearly shown by positive smears of fetal liver substance. Whether it reaches the fetus via the uterus or is carried as a passenger in the egg or the spermatazoon is not known. Tuberculosis is frequently mentioned, though it is held by some as a rare cause of abortion[38]. Overwhelming acute infections of the mother, by the elaboration of toxins lethal to the sensitive embryo, by diminishing the oxygen or nutriment content necessary in the blood, by involvement of the endometrium, and occasionally, perhaps,

by infection of the fetus, frequently bring on miscarriage.

A specific bacillus of abortion has been isolated in cattle, and according to DeLee[2] can cause it in man also. It must, however, be quite rare. Curtis[5,6], of Chicago, has done some very interesting work in identifying as a factor the streptococcus haemolyticus. He reports three cases of habitual abortion, in two of whom profuse culture of haemolytic streptococcus were obtained from bladder urine, in spite of the absence of symptoms; and in the other, marked abnormality of the urine sediment accompanied acute exacerbation of a chronic sinusitis, the relief of which was followed by the first successful pregnancy. Washed cultures from the first two cases, when injected into rabbits, caused either abortion or absorption of fetuses. Control experiments using other than haemolyticus cultures tended to show a specificity of the latter. Hunner[25] reports two cases of multiple abortion which finally carried to term after treatment for ureteral stricture. Underlying this work of Hunner and of Curtis there may be a common principle. Just what was the process by which abortion was caused by the streptococcus is not suggested. Inasmuch as pregnancies mentioned progressed to six months, it is not probable that either gamete is injured, or the beginning embryo. It would seem to be either an overwhelming toxicity from maternal infection, or possibly infection by the mother of the fetus itself. It may be that the placenta or the uterus reacts badly to the presence of haemolyticus infection in the mother, thus checking the nourishment of the fetus. To be sure that specific infection can cause abortion will help; to know its technique as an abortifacient would throw desirable light on the whole subject.

A little has been written about abnormal implantation as a cause of abortion. If Talbot[30] is correct the original factor, even here, is maternal infection. His studies relating placental infarct and placenta praevia to sepsis in the mother are interesting but not conclusive. Control is difficult and coincidence almost impossible to rule out. In the light of Curtis's work, mentioned above, and Talbot's theories as to the causes of placenta praevia, the statements of DeRonville and Madon[20] that this is a frequent cause of miscarriage and that Pinard thinks it the most frequent of all causes become less obscure. DeLee[2] says that "abortion is not seldom the result of it." Williams[1] agrees with this. Green[24] of Australia cites two cases of low implantation in miscarriages at three months and quotes several authorities, some *pro*, some *con*. He himself considers it a rare cause of miscarriage. It seems reasonable that of those cases of miscarriage in which the fetus is not abnormal or macerated and reaches an intrauterine age of four months, a large proportion might be due to placenta praevia—a difficult proposition to prove.

Macomber[4] has stated that absence of the seminal vesicles in rats, hitherto considered a cause of sterility, is really a cause of abortion. Impregnation by such rats is apparently more difficult also, but when it does take place, Macomber says, "a practically normal number of embryos may begin development, but perhaps only one out of four or five of these will come to maturity." This would indicate a definite defect in the male gamete caused by abnormality in the genital system. May not inflammatory reactions in the testicle, epididymis, vas, vesicle, or prostate, so damage the normal physiology of these organs that the struggling spermatozoon is denied from them their particular assistance? Is it not in this way that several of the formerly accepted causes of male sterility do their work?

Defective diet has long been known as a cause of abortion. McCollum[48] frequently stresses the incidence of miscarriage or apparent sterility as an outstanding symptom of subminimal consumption of the various vitamins or of inorganic salts. Lately besides the older known vitamins, so called fat-soluble A, water-soluble B, antiscorbutic and anti-rachitic, all essential for health and probably for normal reproduction, we learn of vitamin X, the *sine qua non* of fertility, the maintenance of which is its particular function[27]. It has been clearly demonstrated in laboratories and zoological breeding stations, as well as on the farm, that there are certain essentials in the diet of fertile mammals. Defective diets in the male must lessen the ability of the spermatazoon: but in the case of the female, is it by affecting the egg or the host of the fetus that poor diet operates? By analogy, the egg may be weakened; but so general are the manifestations of so-called deficiency diseases throughout the whole body, it is easy to think that the uterus and its glandular adjuncts are also injured.

Analysis of the 131 cases of abortion, accidental, criminal and missed, admitted to the Boston Lying-In Hospital between 1916 and 1925 show a varied list of causes to which the abortions were attributed. These were stated or implied in only 42 of the cases. (Records are frequently deficient in such details, because of the depleted wartime staff.) Three were attributed to the use of a pessary to keep the uterus in position, now recognized as a procedure which frequently defeats its own ends. Three were due to toxaemia and four to chronic nephritis. Apart from the pessaries, and six cases of criminal interference, external causes were mentioned in only four other cases, one auto ride, one fall, and two long walks. From what has been said above, this is the kind of given cause which probably does not tell the

whole story. Not so with about ten other cases in which the following causes were given,—one abruptio placenta, one strangulation by cord, one fibroid of the uterus, one diffuse bronchitis, two appendicitis, one myocarditis, one thyroid disease, and two constitutional debility. These sound like real causes from which the fetus died: hence the miscarriage. Seven admitted home induction: one with a catheter, one a slippery elm stick, one a gold pessary, and one claimed that drugs taken by mouth caused the abortion. It seems fairly certain that there is no drug known which, taken in smaller quantities than necessary to poison the mother seriously, will cause death and extrusion of the child. Even pituitrin, which has a certain effect on the pregnant uterus at term or the uterus just after delivery, is notably ineffective as an abortifacient. The popularity of ergot, quinine, hydrastis, etc., is based on the testimony of careless lay observers who think that amenorhoea in those exposed always means pregnancy, and that the succeeding flow must therefore mean abortion. When such an incident occurs following the exhibition of drugs, it is fair to assume that pregnancy was not the cause of the amenorhoea, or that the fetus died from some other cause, and the uterus was thus easily encouraged to expel its noxious contents.

It is probable that in at least five of the cases given above, the causes given were not the efficient agents. What did cause the miscarriage in these and in the eighty-nine other cases in which no cause was given?

Before rational prophylaxis of abortion can be instituted careful study must be made to determine if possible the primary cause of all miscarriages. To this end such work as the Carnegie Institute is doing is especially commendable. Careful examination of the products of conception is, however, only the first step. An especially careful examination of both parents is also essential, for what the laboratory sees is merely the effect of what is to be found in the history, habits or physical condition of either or both parents, if only the searchers could find it.

To attempt this a beginning has been made recently at the Boston Lying-In Hospital. Through the co-operation of the Department of Embryology of the Harvard Medical School and of the staff in Pathology of the Free Hospital for Women in Brookline, all miscarriage products are being carefully examined. The next step is to obtain the co-operation of the patients and their husbands, who must lend themselves to very close and troublesome scrutiny regarding history, habits, diet, physical condition, etc.; for the primary causes are often well hidden. We intend to do this through the Sterility Clinic of the Free Hospital for Women, for the problems in both conditions are practically identical.

DIAGNOSIS

The diagnosis of accidental miscarriage is not usually difficult. The first requisite is, of course, fair assumption of pregnancy, during the early months of which, abortion is by far the commonest cause of bleeding. Reversely, flow is by far the commonest sign of abortion. Other causes of flow, with which in this discussion we are not concerned, must be ruled out: notably, extra-uterine pregnancy, hydatid degeneration, and the various causes of bleeding in the non-pregnant uterus, such as raw granulating cervix, polyp and new growth. Careful history, combined with examination when this is permissible as discussed below, usually makes the differentiation easy. The characteristic flow of extra-uterine pregnancy is an intermittent dribble, often associated with pain or discomfort in one or the other lower quadrants. Such signs and symptoms indicate examination, which may disclose a very tender sausage shaped tumor on one side of the uterus. A ruptured extra-uterine sac groups this diagnosis with those of the acute abdomen, and is not confused with simple miscarriage.

The flow of hydatid degeneration is often watery, may be profuse, or contain small cysts, is usually painless, and comes from a uterus which is larger than the duration of pregnancy warrants. Until the diagnosis is made the case is treated as for miscarriage.

The flow from a polyp, as also from a raw granulating congested cervix, is nondescript, being scanty or profuse, and is painless. If suspected, inspection of the cervix is indicated. If a polyp is seen, it should be removed; if not seen, the case is treated as for miscarriage.

Newgrowths, malignant and benign, may be associated with pregnancy, which, however, they frequently terminate. Flowing caused by them is often not limited to the pregnant period, is painless, and, in the case of malignancy, may have its peculiar characteristics of watery consistency and foul odor. When flow occurs it is usually sufficient to warrant examination, which discloses conditions not consistent with simple pregnancy.

In the series of 131 cases at the Boston Lying-In Hospital, dominant symptoms were mentioned in 112 cases. Flow was complained of in 80% of these. In 61% it was the only outstanding symptom, being associated with pain in the other 19%. In 9% pain was the only complaint. In 8% rupture of the membranes without flow or pain was the chief sign. The other 3% were missed abortion, and came to the hospital because of cessation of growth or foul discharge.

Miscarriages are classified according to the extent to which they have progressed. When only the signs, such as slight flow, and the symptoms, such as mild backache or low pelvic

pain, are present in a normal pregnant patient, we diagnose threatened miscarriage. When these signs or symptoms have progressed to such an extent that there is little hope of saving the pregnancy, we call the miscarriage inevitable. The fine distinction between these two is largely a personal matter, but one of some importance, for the treatment of each kind is radically different. In the one case, it is deterrent and in the other, provocative. Pain, as a purely subjective event, is difficult to assay; and correctly to appreciate it, one must always consider the patient's nervous temperament. Pain, of the variety found in labor, so severe as to indicate sedatives, is probably indicative of final mishap; but not always so, and by itself is not a dependable reason for changing one's diagnosis from threatened to inevitable. Flowing, on the contrary, is objective, and can be approximately estimated. The arbitrary standard in great vogue, is the amount of flow during a normal period. If a patient, threatening to miscarry, soaks with bright red blood five pads in twenty-four hours, she will probably continue to flow until the uterus is empty. In other words, the diagnosis now becomes inevitable miscarriage. Experience and judgment are thus required to recognize the miscarriage which cannot be prevented. The main item of greatest significance is haemorrhage. When this amounts to as much as during the height of flow of a normal period, abortion is probable. When excessive flow is combined with characteristic pain, it becomes almost a certainty; and if also the membranes have ruptured, giving the tell-tale discharge of liquor, there is no more reason to hope.

Combinations of these three signs in varying degrees must be interpreted with judgment in the light of experience. Any one of them in mild degree may persist even continuously for several days, even up to ten, only to disappear with appropriate treatment. Flowing, however, cannot be permitted too long. As soon as the patient shows signs of depletion, active treatment had better be instituted, for there is no assurance that a severe haemorrhage may not occur at any time; a haemorrhage, which by itself would be tolerated, but which, occurring in a patient already partially exsanguinated, may easily be sufficient to turn the scales against her. It is sure to increase the danger of sepsis, which gains easy access in the presence of anemia. Just where to call a halt in cases of prolonged but slight flowing is hard to tell. One must be fearful of the faculty of the patient to adjust herself to repeated small losses of blood. This may continue to a certain limit, but when this is reached she may suddenly go into collapse, though there be no equally sudden increase in the volume of the flow. On the other hand, it is not uncommon to see patients progress safely to term after having stained during weeks of early pregnancy.

Correctly to estimate this factor, one must consider the quality as well as the volume and duration of the flow. "Pink blood", as called by the patient, is mixed with serum; "stringy blood" as well as "brown blood" is probably mixed with mucus, and "dark red" or "dark brown blood" is old flow which the uterus or vagina has only just succeeded in extruding. Only fresh red blood or recent red clots count.

Intermittent flow is not as dangerous as continuous flow, for the obvious reason that the supply of blood is probably brought back to normal during the interims. One must not fail to watch carefully the size of the uterus if a bloody discharge, because it is slight or intermittent, is allowed to persist for weeks. The normally pregnant uterus should continue to enlarge. If it does not do so, the ovum is dead and a useless and dangerous burden to the uterus.

As I have said above, an arbitrary criterion for diagnosing an inevitable miscarriage is the amount of flow at a normal menstruation—five napkins soaked with bright red blood. This is enough. Five days of more moderate or intermittent flow, which, however, uses up three napkins in the twenty-four hours, is also very suggestive. An intermittent flow, the volume of which is less, but which is probably not completely compensated for in the periods of remission, had best not be permitted for long. Haemoglobin evaluation should be carefully made. The minor discharge of pink or brown blood or old clots may be tolerated indefinitely so long as there is no certain indication that the growth of the ovum has ceased.

As suggested above, to make a diagnosis of inevitability, deficiency of flow may be supplemented by characteristic pain or discharge of liquor. The pain I mean is that characteristic of uterine contractions. To make this pain eligible for consideration in a uterus large enough, the contractions must be palpated: but in a three months uterus, this is impossible. The rhythmical, sharp, aching character, as well as the location deep in the back of the pelvis, must give it weight as evidence. If the vagina extrudes blood or liquor co-incidentally with the occurrence of the pain, its identity is established. In cases of doubt, the deterrent treatment for threatened miscarriage should be given. If the contractions subside, they were probably not the right kind. Morphia may diminish the intensity of uterine contractions and materially diminish the pain, but it does not inhibit them.

A patient's testimony of ruptured membranes is usually creditable: she is not likely to mistake urinary incontinence for a discharge of liquor. However, in the absence of other signs of uterine activity, one need not hasten to consider the pregnancy lost. There is no doubt that during the latter months of pregnancy, fluid, some-

times as much as six ounces, may come away, at once, or in a dribbling leak, only to cease promptly or after several hours, even up to twenty-four, to permit the pregnancy to continue to term. The determining factor, other things being equal, is apparently the relative amount of fluid left in the uterus. The amount of fluid lost is affected by the location of the rupture in the membrane, and the position of the presenting part. We believe if the rupture is high up, the rent may seal over before enough fluid escapes to interfere with the freedom of the fetus and the uterine wall. Perhaps we might better account for those cases of cessation of discharge after the waters once break, by assuming the fluid to be not amniotic, but chorionic; and to have been contained, perhaps as a cyst, between the wall of the amnion and chorion; the latter membrane being the only one to rupture, thus freeing only a definitely limited amount of useless fluid. We know that in young ova the two membranes are separated by a fluid chamber, and that only after the first few weeks are these layers normally in juxtaposition, then almost fused, so closely do they lie to each other. Whatever the explanation may be, the mere occurrence of a flow of liquor from a pregnant uterus must not condemn the pregnancy. It need not be considered very serious unless the other signs of trouble are present or follow soon after.

We may then consider these arbitrary standards as those of the inevitable miscarriage, and consider the event which does not meet at least one of these standards as still in the threatening stage.

1. Haemorrhage enough to soak five napkins in the twenty-four hours.
2. Haemorrhage over a period of days too severe to permit continual recovery of the blood supply, as evidenced by blood count and hemoglobin determination, objective appearance or subjective feelings of the patient.
3. Characteristic rhythmic, sharp, aching pain low in the pelvis or back, and not stopped by moderate doses of morphia.
4. Evidence of ruptured membranes in conjunction with or followed by any of the above.

I have not included among these criteria the condition of the cervix which perhaps better than anything else, especially in a primipara, informs us that a given threat will certainly be executed. This can be determined only by digital examination, usually vaginal, occasionally by rectum if the pregnancy is five months along and the finger practiced. In either case the examination is very likely to disturb the already irritable uterus, and is not at all calculated to calm it down. For this reason, it is contra-indicated unless there be good reasons why an immediate decision must be made as to the advisability of active treatment, and signs mentioned above are not convincing. To be sure, a vaginal examination and inspection is necessary to rule out the other causes of bleeding than miscarriage, but a delay of a few days until it is clear that the flow does not necessarily mean miscarriage will do none of those other causative conditions, other than ectopic pregnancy, any material harm. If the attendant even considers the exception mentioned, ectopic pregnancy, as a likely cause of the symptoms, examination is obligatory. If, because of a history of brisk flow and sharp pains, which suddenly subsided, giving place to a meager discharge or serous flow, the attendant suspects that perhaps the uterus has emptied itself into a spacious vagina, which does not, in turn, extrude its contents, he may, with strict asepsis, of course, insinuate a gentle finger in the vagina and across the cervix.

TREATMENT

The reason it is essential for the attendant to decide whether he is to make a diagnosis of threatened or inevitable miscarriage, is because the treatment of one is the antithesis of the other. As I said before, for threatened miscarriage, it is deterrent; for inevitable, provocative. If, in all but 10% we are to consider miscarriage as merely the extrusion of an already dead fetus, and even in the 10% to assume that there is some fundamental abnormality such as endometritis, faulty implantation, hydatidiform degeneration of the villi or some worse defect of the ovum as a primary cause of the threat of miscarriage, why, we may properly ask, should we not, in every case, facilitate the removal of that which if not already useless, will soon be so? We do, as soon as we decide that the miscarriage is inevitable. But while it is merely threatened, we cannot tell the condition of the ovum or its intra-uterine environment. We may assume if there is pathology there, the miscarriage will be accomplished; but merely because we get threatening signs is no assurance that the ovum is not normal and that its environment is not nearly enough normal to suffice, provided we relieve the strain on the patient. Van Dongen[11] found that 38% of his "imminent" miscarriages, with proper treatment progressed to successful delivery of the baby.

This is the reason for treating threatened miscarriage. The treatment itself is simply rest. The patient goes to bed and does not move out of it until she is free from symptoms for at least forty-eight hours. She should not get up to use the toilet. If there is pain, or she is restless, upset, or irritable, opiates should be given in sufficient quantities to keep her quiet and peaceful. Morphia subcutaneously, codein or morphia by mouth, or opium suppositories can be given according to the indication. The

diet should be simple, but food with large residues, such as milk, cereal and the green vegetables, should be avoided. A mild laxative such as mineral oil, milk of magnesia, stewed fruits, may be given if needed to keep the lower bowel from filling up. A low warm enema is not contra-indicated,—indeed is better than constipation. Plenty of water and quiet peaceful surroundings complete the treatment. Some obstetricians use ice-bags over the lower abdomen. Theoretically, cold, though it counteracts congestion, stimulates the uterus to contract. I do not approve of its use. This treatment should be continued for forty-eight hours after cessation of threatening signs. The patient may then be allowed gently to resume normal activity. It is essential that during this period of expectant treatment, everything that comes away should be saved for the attendant's inspection. This includes pads as well as the contents of bed pans in which there is anything which might have come from the vagina. All formed fragments must be carefully examined. Most of them will be only blood clots, but, especially in early cases, one of these occasionally covers the tiny ovum. Its discovery places the case on quite a different basis.

When the signs have been absent for a week, it is well to examine the patient. Now the condition of the cervix may be investigated, both by inspection and palpation. It may be found that all the bleeding has come from a cervical polyp. This should be ligated and removed, but only with operating room facilities, for the haemorrhage may be brisk if more are discovered or a tie slips in such an inacessible spot. The size of the uterus should be accurately noted for comparison the month following. The ovum may have separated and remained in the uterus. It should be removed when this is determined. The fetus may have died, in which case the diagnosis becomes blighted ovum. Blighted ova have been recorded as remaining in the uterus for many years and acting as a stay to menstruation and pregnancy. While the uterus harbors any products of conception not entirely normal, there is no assurance against a dangerous haemorrhage; furthermore, it has been claimed, such ova may become malignant[39]. As soon as one has decided that the ovum is dead, steps should be taken to deliver it.

This is essentially the case where, because of reasons mentioned above, one changes his diagnosis from threatened to inevitable miscarriage. The uterus has demonstrated that it will no longer succor its guest. In its efforts to evict, if there is resistance on the part of the ovum, it may easily cause the patient much loss of valuable blood and energy. It is the duty of the attendant to take the case in hand and facilitate matters to the best advantage of the patient.

In every case when it becomes necessary to empty the pregnant uterus artificially, or even to assist in the process of delivery, whether it be at one month or at term, whether for miscarriage, therapeutic reasons, or dystocia, the condition of the cervix determines the elective procedure. Forcible dilatation is an insult to the cervix which during pregnancy acquires an exalted rank among the vital organs of the body, due to its important function of protecting the growing fetus from the outside world. Violation of the integrity of this organ can cause profound shock.

The degree of dilatation necessary is determined by two factors: one, the size of the fetus, and two, the instrument of choice for dislodging it. Pregnancies which reach the twentieth week before aborting can be expected to end themselves by a kind of true labor: i. e, once the process is instituted either from within or without, dilatation takes place by virtue of recurring rhythmic contractions, which in time extrude the fetus, cause the placenta to separate, and end by emptying the uterus. If the placenta does not come away, it is treated as in cases at term—manual removal, if this is very easy; packing and expectancy, if it is adherent. If there is excessive bleeding in a case of miscarriage after the twentieth week, the case becomes one of placenta praevia, or abruptio placentae, and is handled as such.

In cases which have not gone three months, a small moderately sharp curet can be used with best results. Many[1,2,18] have taught that after three months the finger is the instrument of choice. If the internal os is soft enough, and the finger long enough, and it can be introduced far enough into the uterus to obtain a radius of action, it offers the best assurance that the uterus is empty. But the internal os is not always soft enough, and the finger not often long enough, to obtain free action inside the uterus. It can sometimes break up an ovum, or after the uterus has been emptied, ascertain whether the walls are smooth, but rarely can a single finger accomplish more; and in a pregnancy short of six months, it is not often possible to introduce more than a single finger inside the fundus. For this reason ovum forceps of various kinds are used to break up and extract the fetus and the placenta, the latter after it has been stripped off perhaps by the finger or a large dull curet; or such a curet is used for both separation and extraction.

Apart from the mechanical objection to the finger, there is another reason why we have adopted the use of other instruments. Dietrich[29], in 1923, published the mortality statistics of 10,000 collected cases of miscarriage. Of septic cases without intra-uterine treatment 5.4% died; after curettage, 3.4% of the septic cases died, but after purely digital emptying, 5.9% died. Bocek, of Prague[19], agrees with this disapproval of the use of the finger: he says

that in Schottmüller's clinic the mortality was reduced from 3 to 0.3% by the use of the curet exclusively. Winter[21], who invented an ovum forceps, considers the large broad, blunt curet as superior to the finger. Grabich[23] of Berlin feels likewise. Stein[12], also of Berlin, used this method. Hillis of Chicago, and Hirshfield[17] of Oklahoma City favors curettage. The latter quotes Schottmüller's analysis of 2000 cases in which 77% showed pathological bacteria in the blood stream after manual evacuation, thus implying that infection is carried to the blood sources more certainly by the finger than otherwise. Gordon of Bellevue[16] uses a "stick-sponge", the peculiar advantages of which are not clearly apparent.

Up to the twelfth week, and, in the cases of primiparae, even longer, the cervix is likely to be so muscular and rigid that instrumental dilations would be necessarily vigorous. This is forced dilation and may do considerable harm. It is advisable to soften the cervix first. This is done by stimulating it to begin the normal process of effacement and dilation of itself. The death of the ovum causes this in the larger proportion of cases—the retained blighted ovum being the case of failure. Irritation of the cervix, usually by bougie or bag or gauze pack, is the other method.

In most of these inevitable miscarriages, as is shown above, the ovum has already become a foreign body and the uterus is attempting to get rid of it. In fulfilling our purpose to help it, we have but to pack the cervix inside and out if it is not already sufficiently dilated or dilatable. As much of a narrow strip of gauze as possible is tightly packed into the cervical canal. The outer end of this then is packed into the vaults and in front of and behind the cervix until the whole cervix is encased in what has become a complete vaginal pack. This is usually left in place for twenty-four hours. If there has been active bleeding, it serves the double purpose of dilator and tampon, though in such a case careful attention must be paid to the size of the uterus, that it does not grow larger from internal concealed haemorrhage.

At the end of twenty-four hours, one of two results has usually occurred; either the delivery has been completed and the conceptus is resting on the pack; or the cervix has softened enough to make further dilatation with finger or instrument easy and safe. If neither of these desired conditions has resulted, the treatment should be repeated. Gordon[16] at Bellevue finds this necessary in 10% of his packed cases. Forcible dilatation of the cervix is not to be indulged in except in emergency. The only emergency which commonly arises in miscarriages is from haemorrhage. Such a severe haemorrhage is usually found only in cases where there is low attachment of the ovum. In these cases, the local hyperaemia has rendered the cervix and lower uterine segment quite soft so that the former can be easily dilated, but both very easily torn if force is used. When the patient is already depleted from haemorrhage, any manipulation is contra-indicated whether the uterus is empty or not. Such a case should be packed, restorative treatment, even including transfusion, instituted, and active treatment carried on only after the patient's stable equilibrium has been established.

If, after packing, the rigid cervix merely softens, it must be dilated to admit the instrument selected for cleaning out the uterus. In very early cases, before the twelfth week, and in proper hands, this can be a medium sized sharp curet. Great care must be taken to outline and visualize by means of gentle sounding, the geography of the uterine cavity—how large it is and in which direction it extends; for, to perforate a pregnant uterus is lamentably easy. Such a mishap need not be a tragedy. If the hand guiding the curet has been gentle, and asepsis perfect, and the uterine contents clean, probably no harm is done; and one needs but to watch for twenty-four hours to make sure there is no excessive intraperitoneal hemorrhage. Infection in such a case is extremely rare. If the guiding hand is too strenuous or awkward, a loop of intestine has frequently been known to be caught in the instrument, torn from its mesentery and dragged through the wound. This is a catastrophe requiring immediate surgery of the most dangerous kind. If the curet has perforated a septic uterus, there is possibility of pelvic peritonitis. It may be desirable to place a vaginal drain in the posterior cul-de-sac. If there is haemorrhage, laparotomy is essential.

The surgeon, clearly visualizing the uterine cavity, should curet each facet in regular succession. The products of each scratch should be carefully examined. One shred of muscle tissue indicates that further scratches along that one line are distinctly not necessary. Great care must be taken to reach the fundus, often curved well anterior to the cervical canal. It is mortifying carefully to curet a uterus, only to have the patient start in labor twenty-four hours after the operation and deliver an intact ovum. This occurs with distressing frequency.

If the pregnancy has advanced beyond the twelfth week, the gloved finger, covered with gauze, may start the work of emptying the uterus. The finger is swept around all the inner surface of the uterus, dislodging and breaking up the ovum. This is then carefully removed piecemeal with a dull curet or curved half-length. This latter is a vicious instrument if it is allowed to perforate.

When the uterus is empty of foreign bodies, it will stop bleeding. In general a persistent flow means that products of conception still remain, perhaps partially attached to the uterine

wall. With care, the curet can usually dislodge these. To stop the slight oozing from raw surfaces, a pack soaked in alcohol or iodine may be left in the uterine cavity a few minutes or longer if necessary. It should be removed after twenty-four hours at most, and replaced by another if the bleeding continues. If the uterus bleeds, in the absence of hemorrhagic disease, it should not be considered empty. When the pregnancy has gone to five or six months before abortion, the placenta, which of course is of the mature type, or any part of it, may be actually adherent and should be treated as a placenta accreta by packing. It must not be ripped off with the finger—the uterine wall is too thin and easily torn.

We have considered the diagnosis and treatment of threatened and inevitable miscarriages. We shall now go on to those called incomplete; later, those called complete. The differentiation is self-explanatory. The treatment of incomplete miscarriage is that of the inevitable miscarriage, from which it is distinguished only by the progress it has made to actual delivery of part of the ovum. The treatment of uncomplicated complete miscarriage is the simple expectant treatment of the normal puerperium. Usually ten days in bed is well worth while. Involution is sometimes slow, when a mild flow signifying hypertrophy of the endometrium, may necessitate gentle curettage. Many men, as a routine, curet all cases of complete miscarriage as soon as they are seen, with the theory that this is the best time to assure oneself that the uterus is really empty, and that by cureting now, while the case is still clean, speedy convalescence is assured: a principle which, I believe, should be applied with great discretion.

There are two complications which demand primary consideration and which may necessitate modification in the treatment of both incomplete and complete miscarriage.

Haemorrhage is always a compelling emergency taking precedence over all other considerations. Regardless, the flow of blood must be stopped. It can be controlled by packing. Once it has begun in earnest, the uterus will probably not stop flowing until it is empty. If the patient has lost an appreciable amount of blood, as suggested above, it is well to temporize with pack, rectal taps, hypodermoclysis, or even transfusion, before attempting active operative emptying of the uterus.

The other modifying complication is infection, much more common before the twentieth week than after it, and usually seen in incomplete cases. The procedure in the presence of sepsis requires nice judgment and delicate technique. It may be that the putrified conceptus is a focus for toxic absorption and should be removed as promptly as possible; but it may be that there is an endometritis, walled off in the uterus by an indurated wall of leucocytes in which the well intentioned curet is quite likely to open wide gates through which the attacking organisms can advance into the general system. Dr. Newell says: "I have not yet found any absolute means of determining . . . between the toxaemia of abortion and septic infection." He emphasizes the time factor in differentiation, feeling that a patient seen fairly early with a temperature will stand curetting much better than a patient who has run a temperature for several days. I believe that a temperature of 101° with a pulse of 100, before the twentieth week, usually indicates a dangerous infection which will tolerate nothing more drastic than a light pack (which is often ineffective) supplemented by intramuscular pituitrin or quinine hydrochloride by mouth. If the patient is toxic and sick, the uterus had certainly best be left alone. In cases past the twentieth week, the condition is more serious and the uterus should not be invaded. Haemorrhage of course takes precedence over sepsis and is treated without regard for the latter.

If there is fair assumption that there is absorption from toxic products dammed back in the uterus, it is justifiable to assure drainage by gentle finger dilatation of the cervix. Remington Hobbs[8] proposes even further procedures to insure drainage. In his very persuasive paper he outlines the causes of the stasis which is followed by sepsis. We may merely mention four of them, the treatment for which is obvious: 1. loaded rectum, which changes the position of the cervix and blocks it; 2. swollen sutured perineum (in cases delivered at term); 3. malposition of the uterus, as affected by position of patient; 4. the main cause is swelling of the mucous membrane of the cervical canal, causing back-up, hypertrophy of the uterine wall, and alteration in the shape of the uterus. The stasis is not, he says, in the uterine wall, where the flow of lymph prevents it. His treatment is proposed to increase the current of lymph outward from the uterine wall by instilling glycerine into the uterine cavity, and to insure cervical drainage by placing a terminal eyed catheter in the cervical canal. He says: "We find that if a soft rubber tube, well lubricated with glycerine be gently and slowly introduced through the cervical canal, (he forbids dilatation and also use of vulsellum forceps) any secretion in the uterine cavity will drain away by its side. If the tube is left in from three to six hours, acting as a foreign body, it produces uterine contractions, which force out the secretions beside the tube; but at the end of that time, that is, before the uterus is exhausted, the tube should be removed."

I have proposed very conservative treatment for the incomplete septic miscarriage: but I have also proposed speedy emptying of the uterus as soon as the diagnosis inevitable is

made, provided the case is clean. Routinely, all cases of afebrile inevitable miscarriage, which come to the Boston Lying-In Hospital are emptied unless they are actively emptying themselves. We do not wait until sepsis begins nor until haemorrhage has become serious. If the uterus is emptied early enough, both of these misfortunes may be largely avoided and the patient's hospital stay shortened.

I have analyzed only 131 cases—all those admitted to the hospital in the last ten years. The detailed statistics derived from study of these show, I believe, that the treatment outlined above is proper. Consideration must be given to the fact that these are, in the main, selected cases. Most of the abortions coming under our care are confined to the out-patient department, being sent into the house, only if complications arise, or home conditions preclude rest in bed. Some simple cases are included, however, having come directly to the hospital from private doctors. Hence of the 131 cases considered only 11 were discharged undelivered—8%. With practically the same conservative treatment, VanDongen[11] found 38% of his threatened miscarriages continued to term. The rest of our cases are in the out-patient department and not considered here.

From the group studied, I have also separated from further consideration seven other cases: three of these left the hospital against advice, refusing further treatment; in the case of four others, the abortion was but an adjunct to something worse; one fibroid and pus tube, two suppurated appendices, and one severe myocarditis. This last patient died of the myocarditis two days after spontaneous delivery, the abortion being but an incident of extreme decompensation. Hers was the only death in the series.

Of the 113 remaining cases, 23, or 20%, had a temperature of 100 or more either the day of delivery or before this event. These are considered febrile cases. The proportion is similar to Gordon's[16] series from Bellevue where 20% of 961 cases were septic. Of Pelkonen's[13] 1174 cases, when 99.2° instead of 100° was the dividing line, 33% were febrile; Bovin[15] counted 30% febrile of 3806 cases. Grouped, these 5941 cases have a slightly higher incidence of sepsis than our series, 29%.

Mortality statistics vary somewhat:—Gordon[16] of New York—1.8%; Hillis[9] of Chicago—2%; Tuttle of Panama[10]—2.2%. That there were no deaths from abortion among our 113 cases is but negative evidence that our treatment is correct. Of those mentioned, Gordon and Hillis apply very conservative treatment, i. e., they actively intervene only after waiting four or five days in cases which remain below 100°, or after waiting until four to five days of normal temperature have succeeded a period of temperature above 100° (unless of course their hands are forced by haemorrhage).

It is noteworthy that more than half of Gordon's cases are packed, not cureted. In contradistinction to Gordon and Hillis, Tuttle maintains that, "in ordinary incomplete abortion the sooner the uterus is emptied the shorter will be the convalescence." He also offers his statistics to show that among the operative cases there is a lower morbidity percentage and fewer average hospital days than among the non-operated cases. This is not so with our small series where both morbidity and average hospital days were greater among febrile cases operated on than among those who delivered spontaneously and received no intra-uterine manipulations. Those operated on spent, on an average, three more days in the hospital; there was half again as much morbidity as among the non-operated cases.

Tuttle had 79 cases of septic abortion with twelve deaths. Sixty-four of these seventy-nine cases were operated on, and, of them eleven died—a mortality of 17%. This seems tremendous. Only one died of the fifteen cases which were not operated—6.6%. It would seem that these figures strongly supported the popular contention that a septic uterus whether after miscarriage or at term must not under any circumstances, except haemorrhage, be entered. One must await the results of further application of Hobbs' method of drainage as mentioned above. Surely, active cleaning out of the uterus in such cases is not advisable.

The average hospital stay for afebrile patients not operated on was 9.3 days, of those operated, 9.6 days, and of the febrile patients not operated on 9.5 days:—all three the same for practical purposes. The stay of febrile patients operated on was 12.3 days. The morbidity percentage in febrile patients not operated on was 30%. If febrile patients are operated on their stay in the hospital is longer and their chance of running a temperature after delivery is greater than if they are allowed to deliver spontaneously[9,21,22]. If afebrile patients are operated on their stay in the hospital is not longer than those delivering spontaneously, though more of them will run a temperature after delivery.

From 20% to 25% of cases may be expected already to have become infected to some degree by the time they reach the hospital for treatment. Most of them will be incomplete abortions. I have already stated our attitude toward these cases and have given an arbitrary limit for active treatment—temperature of 101° with a pulse of 100. This attitude is a mean between the two groups of practitioners, those advising active treatment like Tuttle, and the ultra conservatives like Hillis, Bovin of Stockholm, and Winter of Königsberg. Tuttle also has his supporters. Simon[14] considers that in

every uncomplicated case of abortion with fever, no matter what the degree of fever, if the cervix admits a finger, if the case has not been treated before, and if bleeding has not continued more than three days, the uterus should be emptied. "Every day's waiting makes prognosis worse for active treatment." Fritz Stein[12] is also an adherent of the school which teaches active treatment. From Schottmüller's clinic at the Hospital in Eppendorf Stein collects 1000 cases of abortion only six of which are afebrile and offers an analysis of these to show the disadvantages of conservative treatment. This clinic is one of those where bacteriological studies are made on all abortions, but even when haemolytic streptococcus seems to be the active agent of sepsis, the uterus is promptly emptied, preferably with abortion forceps and a large blunt curet.

Warnekros[28] reports on 1000 cases of septic abortion from the clinic at Berlin University. His figures support his contention that "conservative treatment of febrile abortion is no longer permissible." And like Stein, again, he believes that the demonstration of haemolytic streptococcus in the uterine discharge proves nothing. Grabich[23] feels exactly the same way about both questions: he too believes in active emptying of the uterus, preferably with a blunt curet; and that the presence of haemolytic streptoccus is of no importance. VanDongen[26] from Haarlem advises that incomplete abortion requires active treatment, but his statistics, like those of Tuttle from Panama, are not conclusive as regards febrile cases with involvement outside the uterus. His mortality in these was 30.2%. His mortality in uncomplicated febrile cases, however, was but 1.09%; but the mortality of febrile and cureted cases was 32%, of febrile but uncureted, much the same, 27.8%. These figures are very high, partly because VanDongen classed as febrile only those cases with a mouth temperature above 102.2°; but even then his figures seem high. Hillis[9] had a gross mortality of 2%. He lost three of twelve febrile patients who were cureted, 25%. From these three men we must learn that patients who are really septic must not be cureted. Pelkonen of Finland separates his febrile cases not by height of temperature, as I have suggested, but by palpable evidence of inflammation outside of the uterus, much as does Simon[14] as mentioned above. If there is no "morbid tenderness" in surrounding structures he advises active emptying of the uterus.

On the other side of the proposition, Hillis[9] of Chicago is much in favor of waiting for complete defervescence before attempting to empty the uterus artificially. With him is Bovin[15] of Stockholm, who quotes a mortality of 1.9% among fifteen febrile cases evacuated after the fever had disappeared as against one of 8% of 75 cases cureted while running a temperature above 99.4° by mouth. Gordon at Bellevue treats all cases of incomplete miscarriage expectantly unless hemorrhage forces, or visibility of products invites, interference. His gross mortality is only 1.8%: his mortality in 193 septic cases, which are all with a temperature above 100° by mouth, is only 6.2%. None of these septic cases had intra-uterine treatment. Comparisons are not to be too finely drawn, for each man sorts his cases very differently. It is interesting that of the fifteen septic cases which Tuttle treated as Gordon would have, only one died—6.6%, like Gordon's 6.2%. Of 79 cases which Tuttle treated his own radical way, 15% died.

Unlike Stein[12], Warnekros[28], and Grabich[23], Winter[22] of Berlin maintains that the presence of haemolytic streptococcus in the vaginal discharge of an incomplete abortion contra-indicates any intra-uterine treatment—otherwise, apparently, he considers it safe to give active treatment. If bacteriologic examinations cannot be made he advises conservative methods exactly like Hillis and Bovin. Bocek[19] of Prague agrees with Winter concerning the great importance of haemolytic streptococcus as the really dangerous factor, and forbids interference in its presence.

Thus we have the conservatives, Hillis, Gordon, Winter, and Bovin on the one hand and the radicals, Tuttle, Simon, Warnekros, Stein and others on the other hand. At the Boston Lying-In Hospital our position lies midway between the two. We are too conservative to enter a septic uterus and too radical to wait on an incomplete case which is short of septic.

CONCLUSIONS

Most spontaneous miscarriages in man, as in lower animals, are caused by intrinsic disturbances in the fertilized ovum, or in the maternal organism, and not by the traditional extrinsic environmental accidents to the mother.

The causes of sterility and of miscarriage are probably, in large part, identical, the two conditions being, as Macomber and Reynolds have taught, but different degrees of diminished fertility. Causes of miscarriage should be studied in fine detail, which includes careful examination of both parents as well as the products of conception.

Diagnosis of miscarriage is usually easy. The important difficulty comes in discriminating between a merely threatened, and an inevitable miscarriage. Various criteria for judgment are given above.

The treatment of threatened miscarriage is deterrent. That for inevitable and incomplete miscarriage is provocative. Many authorities with their statistics are quoted—some advise great conservatism in treatment; others, extremely aggressive procedures. Analysis of 131

cases at the Boston Lying-In Hospital shows good results from a routine which permits conservative treatment of the case which is progressing properly by itself, and interference, before trouble is reached, in cases which are not progressing in the right direction. A septic uterus, except in cases of active and severe haemorrhage, should not be invaded.

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A CLINICAL STUDY OF MUSCULAR CRAMP: A PHYSIOLOGICAL CURE

BY G. W. FITZ, M.D.

THIS report is based upon an intimate study of many cramp seizures. The method of treatment by CO_2 retention has been found invariably effective in approximately one hundred applications to cramps of various muscles of thigh, leg, foot, abdominal wall (rectus abd.) and diaphragm. By its control of clinical idiopathic cramp it definitely establishes the alkalosis theory of the cramp state.

The subject who will serve as a type victim is an active, strong, temperate man of 190 lbs. weight. The only experiences which would seem to have had etiological responsibility were an exhausting bicycle ride of ten miles against a heavy wind several years prior to the cramp onset, and a moderate sacro-iliac strain two years previous. To these later history added abscessed teeth of unknown duration. He had never been subject to cramps aside from an occasional foot cramp in early life.

The cramp seizures began infrequently, but with full intensity, ten years ago at the age of fifty-five. The first one, of the quadriceps of both thighs, occurred during rest after a vigorous swim in cool salt water. Thereafter they were usually at night, during sleep, and involved most frequently the quadriceps, but at times the inner hamstrings as well as leg and foot muscles. They were more frequent after fatigue from standing, when they were also apt to attack both legs, which was, however, unusual. When both legs were attacked the seizure in one preceded that of the other by an appreciable interval. The cramps favored one leg for months at a time, then quite unexpectedly shifted to the other for a longer or shorter

period. They were always a continuation of a voluntary effort, sometimes very slight. There was no appreciable diminution of strength and the reactions were normal.

The contractions most frequently and characteristically attacked the distal parts of the quadriceps femoris, but quickly extended in rhythmic waves through a considerable portion of the length of the muscles. The attack started quite uniformly in the vastus internus; that it extended to the rectus was evident from the difficulty, or even impossibility, of extending the thigh during the tetanus. The intermedius was also probably involved but it was impossible to determine the share in which each participated. The proximal ends of the muscles were soft and elastic, though more tense than normal, due to the stretching. The agonizing pain indicated that every nerve in the hard mass of muscle was pinched "as in a vise."

The tetanus lasted for ten to twenty minutes, unaffected by any local treatment except the intense heat radiated by a nearby fire, which slowly thawed it out. After the muscles became entirely soft, a new contraction frequently started, but this was usually of shorter duration, especially under the influence of heat. A second recurrence was not experienced. The attacks were irregular in onset and seemed to be influenced by position in bed. Bent knees invited cramp of the thigh muscles not only in sleep but also in getting out of bed when rising from a sitting position, and even when sitting in rest. There was always an irresistible impulse to fight the cramp by standing and walking about even in the coldest weather. This method, while effective with foot cramps, is not without serious danger when the cramp is of the large thigh muscles and the victim faces the possibility of finding himself in helpless agony on the floor of a cold room without proper clothing.

All efforts to lessen the frequency and severity of the attacks by variations of diet, clothing and activity were of no appreciable value. For two years, in spite of these experiments in prophylaxis, the only relief obtained was from the use of salicylates in full doses, which gave immunity so long as they were continued. Then fortunately a succession of slight joint affections pointed to the teeth, which were found abscessed. Their total extraction cleared the joints, improved the health and stopped the cramps.

Two years ago, however, the cramps began again in full severity and frequency. I then determined to test out the alkalosis theory of the cramp state. The most natural and promising method of quickly reducing the relative alkalosis of the blood and of the tissues concerned in the tetanus, was to prevent the escape of CO_2 from the blood in the lungs by breath-holding and rebreathing. The fact that the cramps usually occurred during sleep made it necessary to focus the study upon observations of cramp behavior under the influence of the CO_2 retention.

For this purpose a paper bag was carried in the pocket and put under the pillow. The attack, however, occurred at night and found the bag displaced. The subject accordingly held his breath as long as possible and then smothered himself under the bedclothes and rebreathed as slowly as he could. The cramp developed more deliberately, was less painful and unnerving. The waves of encroachment of the tetanus could be studied as it advanced through the muscles, now quickly, now slowly, as if "digging in," and again forward with a rush. This was rapidly repeated until the full contraction was reached; then after a time it retreated, slowly at first, then faster until the muscle was soft again. A moment later like an echo, came another tetanus as complete as the first but more quickly over. Then came peace, comfort, sleep. The contrast with all previous experience was so marked that I was convinced we were on the right track.

The next attack was treated by breath-holding and rebreathing from a No. 8 paper bag. The pain was very markedly reduced, the duration of the tetanus shortened and the secondary nearly obliterated. Further experiments showed that this physiological manoeuvre of CO_2 retention was effective in reducing the pain and disability of the cramps to minor discomforts in proportion to the quickness of its application. The amount of rebreathing—two to five minutes—required to check a cramp did not cause a headache or other toxic symptom, but on the contrary favored restful sleep after an attack. It is interesting to record that in the two subjects most continuously studied, the treatment seems to have had a lasting curative effect, since the attacks have been reduced in frequency from one or two a week to not more than that in several months. This may well be due to the greatly reduced traumatism of the parts of the neuromuscular mechanism concerned in the tetanus.

The bag that was found most satisfactory for the rebreathing is made of rubber cloth and is of three pints capacity. The opening is large enough to cover nose and mouth and is stiffened with soft copper wire shaped to the face. This bag is tight, noiseless and easily pocketable. Since it must be pressed tightly to the face in rebreathing, accidental suffocation is impossible, for the slightest failure of attention permits the bag to drop away sufficiently to let in fresh air.

Technic:—At the first intimation of a cramp, the breath is held at whatever stage of the respiratory cycle it happens to be, the empty bag is applied and the breath is released into it as late and as slowly as possible. At this point there is too little air for use in rebreathing, therefore at each inspiration when the bag empties, a little air is sucked in to permit the deep-

ening respirations caused by the increasing venosity of the blood. This air addition supplies oxygen with but little dilution of the CO_2, hence is preferable to starting either with a full breath, or with a bag full of air, both of which delay the effectiveness of the rebreathing. One thus avoids the feeling of suffocation and at the same time eliminates the possibility of producing oxygen want which might arise from the use of a small amount of air.

This technic acts so quickly that, in some instances, the cramp is aborted with only a few weak twinges to indicate its severity if untreated; in others, it is stopped merely by the breath-holding and slow shallow breathing. This can be successful only if one is awake and able to recognize and react to the first twinge, since an exclamation, a long inspiration, or an attempt to speak, may permit the cramp to develop to the point where the use of the bag for rebreathing, or heroic breath-holding, is necessary for the control of the tetanus.

In seeking a valid explanation for the immediate analgesic and antispasmodic influence of CO_2 retention on tetanus, we are faced by all the complications of the neutrality control complex of the animal body. The experimental observation[1] that excessive washing out of CO_2 from the lungs and blood by continued deep breathing produces the tetanic state gives a most important clew. That the relative alkalosis produced thereby is the probable cause of this state seems proved by the fact that alkalosis is the only recognized common factor in the experimental and clinical conditions in which tetanus arises spontaneously, viz, over-dosing with alkalies, excessive loss of acid through a gastric fistula or by profuse vomiting or purging, the "alkaline tide" after meals, and the undue purification of the alveolar air by continued deep breathing[2]. That the alkalosis must act on the nerve cells rather than on the muscle fibres is evident since contraction in a muscle not only produces a large amount of acid, both lactic and CO_2, but also, by its stoppage of circulation in the muscle due to the compression of the intramuscular vessels, prevents the escape of the acid, thus causing intense acidity in the contracting muscle. In the nerve cells, on the contrary, acid production in activity is so slight that the unimpeded blood flow carries it off before it has a chance to overcome even the alkalosis of the active nerve cells themselves.

Analysis of the tetanus caused by voluntary over-breathing in normal and pathological nerve conditions seems to show[3] that the parts of the neuro-muscular mechanism concerned in the tetanus are those which produce tonus, i. e., the motor cells of the cord together with their controls from above. It thus seems that the docility and promptness of the response of the lower motor cells to control by the higher centres depend upon the delicately poised "neutrality" which the animal organism so zealously guards in its marvelous chemico-physical laboratory. When the neutrality balance is lost toward alkalosis, as in hyperpnea, the motor cells of the cord seemingly become partially independent in their stimulation of the muscle fibres; when the impulses come to them from control centers they jump to their work too vigorously and continue it, either in spite of the efforts of the higher centers to make them stop, or in the absence of such inhibition.

Experience in the use of breath-holding and rebreathing in tetanus shows that this trigger state of the neuro-muscular mechanism may quickly become normal under CO_2 accumulation. The time within which normality can be thus regained was shown by my experiments with cramps to be often as short as one minute. This is consistent with the findings of Y. Henderson that a sudden increase of CO_2 occurs in the expired air, if the breath has been held as long as forty seconds, i. e., until the non-aerated blood from the lungs has gone to the tissues and back to the lungs again. The tissues therefore, begin to receive the venous blood in about half this time, and we may assume that the nerve cells of the cord, which are fairly near the heart receive the extra CO_2 in fifteen to twenty seconds from the beginning of breath-holding and that subsequently they receive blood of an increasingly rich CO_2 content. A further time is undoubtedly required for the diffusion of the CO_2 into the nerve cells which somewhat lengthens the latent period of the CO_2 effectiveness. That this diffusion is quickly accomplished, however, is proved by the fact that, clinically, pain and contraction frequently begin to be affected within the time of breath-holding, i. e., from thirty to forty seconds. In the less severe attacks, the cramps are even aborted in that time provided the breath is held instantly without air intake.

The theory of Rosett that the tetanus from voluntary over-breathing is an exaggerated tonus, reflexly directed into the acting muscles by the inhibiting mechanism which relaxes their opponents, seems consonant with my experience with idiopathic cramp. The thigh muscles were never attacked when the knees were straight and the tonus presumably evenly distributed to all the muscles about the joint. When the knees were flexed more than 15°, the extensors, which were thereby stretched and reflexly given increased tonus, were attacked. In sleep, cramps could be avoided if the legs could be kept straight: in rising, it was necessary to roll out of bed stiff-legged, especially if called suddenly out of sleep, or run the risk of cramped extensors.

From the foregoing, it is logical to assume that tetanus from over-breathing and idiopathic cramp not only results from the same condition,

alkalosis, but also that the alkalosis may be due, in part or wholly, to the same cause, hyperpnea. In one case, the over-breathing is voluntary and in a resistant subject; in the other, reflex in a susceptible subject, the stimulation arising from either the excitement of dreams or other emotional condition, or through the carrying over of the respiratory acceleration from activity into a rest period when the CO_2 production is greatly reduced. In sport, the condition may even approach voluntary hyperpnea when the air requirement for vocalization, as frequently in sea bathing, greatly exceeds what is needed for lung ventilation. The saving condition in sport, in absence of cold and exhaustion, seems to be that the activity itself ordinarily serves to protect from cramp, possibly as an auto-massage effect, since attacks tend to occur during rest and the tendency rapidly disappears with movement. It is not impossible that the panting respiration of athletes after contests may produce a condition of hyperpneic alkalosis if the contestants rest, instead of walking about until the normal respiratory balance is attained. This would justify an empirical rule of many years on some athletic fields.

Personal susceptibility to cramp is marked and far more common than is generally recognized. The reason for this is obscure, but may ultimately be traced to the instability of some process or reaction of the neuro-muscular complex.

These considerations suggest the possibility that other tetanic type seizures may be influenced by an associated, more or less ephemeral, alkalosis. May not epileptic attacks have in part an alkalosis basis? The asphyxia due to the tetanus of the respiratory muscles commonly marks the end of the tonic convulsion, i. e., the involuntary breath-holding has cured the tetanus. Is it possible that the deep breathing in the aura of the attack has added the effect of alkalosis to the nerve instability, and, even if it has not precipitated the attack, has at least augmented it?

The rebreathing manoeuvre offers an easily applied test to determine the extent of this influence, since amelioration of the symptoms may be accepted as proof of the presence of an alkalosis of clinical importance. It is to be hoped that this possible extension of the usefulness of the manoeuvre beyond the domain of idiopathic cramp into that of functional nerve instability may appeal to some of those clinicians who see such cases and that they may give it a fair trial.

COMMENTS

(1) Change in the reaction of the blood toward acidity, through retention of CO_2 by breath-holding and rebreathing, stops idiopathic cramp.

(2) An immediate cause of cramp is, therefore, a relative alkalosis, possibly of very ephemeral duration.

(3) Alkalosis seems to permit the lower motor nerve cells to act independently of their controls in continuing muscular contractions in opposition to inhibitory stimulation normally effective to produce relaxation.

(4) Susceptibility to cramp may well mean

(a) An over-active respiratory control which favors the production of alkalosis by hyperpnea, or,

(b) Instability of neuro-muscular elements which causes over-sensitiveness to slight transitory changes in blood reaction, or,

(c) both of the above acting together.

(5) CO_2 retention furnishes an easy method of testing tetanic seizures to determine whether alkalosis is an associated factor of importance.

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WHY WE USE "DROPS" IN FITTING GLASSES

BY DAVID W. WELLS, M.D., F.A.C.S.

Glasses are worn first to improve vision and second to relieve eye strain. The fact that eye strain exists, notwithstanding the patient has good vision, seems not to be a matter of common knowledge, even with the medical profession.

Some years ago the writer examined the records of 100 consecutive cases of patients who consulted because of symptoms of eye strain, for whom glasses were prescribed, and relief of symptoms followed. Just about one-half of these patients had practically normal vision without glasses.

In order to explain this it is necessary to understand the mechanism of accommodation. Unlike an optical instrument the eye automatically changes its focus to adapt itself to seeing an object clearly at whatever (distance) it may be situated.

The thickening of the crystalline lens, to focus the eye for a near object, is shown by dotted line. If the eye be normal, or nearly so, this is

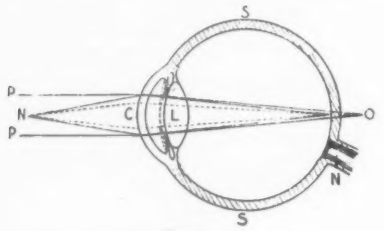


FIG. 1.

accomplished without any appreciable effort or strain.

There are three principal errors of refraction: Far Sight, Near Sight, and Astigmia.

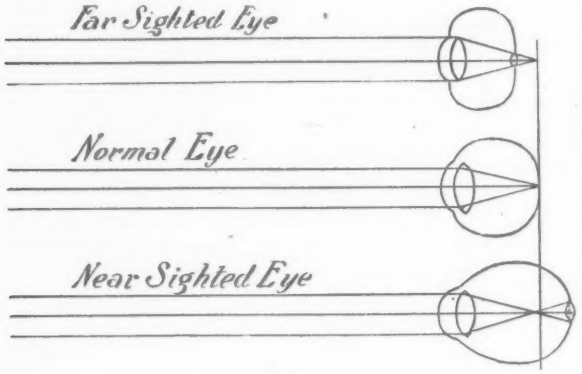
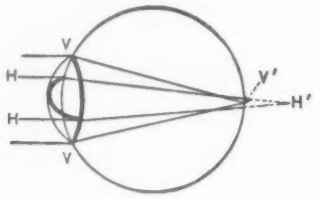


FIG. 2.

Astigmia is the most potent cause of strain, because the accommodation to clear vertical lines is different from the amount required to clear horizontal lines, and as letters are made up of such lines it is difficult or impossible to see them clearly.



ASTIGMATISM. — FIG. 3, FROM THORINGTON'S "REFRACTION."

Persistence in this effort at times produces a spasm of the accommodation, the ciliary muscle, so that the lens which clears the vision may be adapted to an artificial error. A case of far-sighted astigmia is thus converted into an apparent near-sighted astigmia, and lenses so prescribed will fail to relieve the strain although they may improve the sight.

Since one can never tell with certainty when this condition exists, the only way to find out if the manifest error is the real error is to paralyse the ciliary muscle. The drugs which do this are called cycloplegics. The principal ones, in the order of their potency, are Atropine, Scopolamin and Homatropine. The effect of atropine lasts about a week, scopolamin four days and homatropine one day. The power of the ciliary is greatest in the young, and therefore with children atropine is most frequently used. At the age of forty or forty-five the normal eye has lost so much of its accommodation that a magnifying lens is necessary to enable the patient to read. No further relaxing is indicated and one visit usually suffices. Most oculists do not use a cycloplegic after thirty-five. For patients twenty years old homatropine is usually sufficient to relax the accommodation, although occasionally a stronger drug is necessary.

The refraction as measured under a cycloplegic is called the static refraction. Since the muscle has a normal tone, about ½ dioptre, the static refraction is never the glass given, unless it be a case in which the eyes tend to turn in. In this condition glasses which blur distant objects a little often give most relief.

In astigmia, not only the *amount* of the error, but the *exact axis* of the correcting cylinder must be determined. This can be done best under a cycloplegic.

Practically all cases are examined after the effect of the cycloplegic has worn off. Thus a thorough refraction examination requires three visits:—the preliminary, under the cycloplegic, and the post-cycloplegic.

Another advantage of the cycloplegic is that it enables the oculist, by means of the ophthalmoscope and retinoscope, to measure the refraction objectively quite accurately, independent of the patient's answers to questions. This is particularly important in fitting children.

Cycloplegia also frequently prevents one from prescribing glasses which are too strong. The enforced rest of the ciliary is valuable in relieving the eye strain temporarily. A record of the *total* error is important for future examinations, as with this it is usually unnecessary to repeat the cycloplegic. Glasses prescribed in this manner do not require frequent changes. It makes for economy.

When to use the drugs, and how to use them, is of course reserved for the medical profession, as it is often inadvisable and in an adult at times dangerous. All reputable oculists understand these conditions and can be trusted to use proper discretion.

The problem of eye strain is not a simple matter, and if it be a refractive error the *exact* correction will often relieve where the *inexact* has failed. A small amount of far sight does not require correction, and the use of a cycloplegic frequently enables the oculist to say that the patient does *not* need glasses.

Symptoms of eye strain often exist when the

refraction is practically perfect. A failure in the working together of the two eyes, incoördination, is a potent cause. This condition can usually be relieved, and many times cured, by stereoscopic exercises which teach the eyes to work together. Not infrequently a patient is given glasses correcting a slight error of refraction, when the real cause of trouble is an incoördination. The two conditions often coexist, and the correction of *either* may relieve. Naturally the patient is much better pleased if he can be cured without glasses.

It is, of course, understood that the oculist, being a physician, takes a careful history at the first examination, frequently examining the nose and pharynx, and is keen to the possibility that a sub-acute sinusitis may be the cause of persistent headache. He recognizes nervous instability and is on the alert for malingering.

Since all cycloplegics enlarge the pupil, the ophthalmoscopic examination of the fundus and lens can be more thorough. Beginning cataract frequently involves the periphery of the lens, and is covered by the iris when the pupil is of normal size. Small hemorrhages in the periphery of the retina may not be seen with a small pupil, and may not affect vision. The same is true of sclerosis of the retinal arteries.

To sum up: The use of a cycloplegic substitutes knowledge for guess work. It frequently shows that glasses are not necessary. It enables one to report to the family physician with more certainty to what degree eye strain may be a factor in producing the symptoms.

The Massachusetts Medical Society

THE CONTROL OF THE COMMUNICABLE DISEASES PREVALENT IN MASSACHUSETTS*

With a Study of the Mortality Due to Them During the Past Seventy-Five Years

BY EDWARD G. HUBER, M.D.

(Continued from page 799)

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TRANSMISSION OF TYPHOID FEVER

The causative organism leaves the body in the feces and urine chiefly. It does not live long outside the body, so that if fresh human feces and urine could be kept from the mouths of human beings typhoid could be practically eradicated. The bacilli live a few days only in sewage or in privy or cesspool contents. Exceptionally they may live for weeks or months outside the body, more readily in clean water than in sewage. Milk, on the other hand, is a culture medium. The organisms gain entrance into the human intestinal tract in a variety of ways:

1. Historically and because of its importance as the vehicle guilty of transmitting by far the majority of these infections, water always has been and still is the most important single means of transmission. And yet, evidence that water does transmit typhoid is circumstantial for the organism has actually been found in water in exceedingly rare instances. Morbidity from this source has been enormously reduced but, especially in rural regions where the water supply problem for each small community and even for each farm house is diminutively that of the metropolis, this vehicle is far from negligible.

2. Contact infections take second place in importance. There are innumerable ways in which they may take place, both direct and indirect. The former method involves direct transference of infected discharges to the mouth of a healthy individual. "Food, fingers and flies" play an important part in contact infections. Experimentally, flies have retained typhoid bacilli in their bodies for twenty-three days.

3. Carriers are undoubtedly responsible for a large proportion of the cases transmitted by indirect contact. Such individuals employed as cooks, waiters and dairy workers may infect many persons. Koch was the first to make a scientific study of the question, and Sacquépée and lately Garbat have made splendid contributions to our knowledge of the subject. There are two types of carriers,—incubationary and convalescent. The former, as implied by the name, distribute organisms during the incubationary and prodromal stages of the disease, before the diagnosis is made. Convalescent carriers may be temporary or permanent. Arbitrarily the line distinguishing these two types

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is drawn at three months. In the majority of convalescents the bacilli disappear with the fever but in four percent approximately they persist for a few days to as many weeks or more. Two percent persist at least three months and a half of these become permanent carriers. Garbat found, in a very carefully studied epidemic, that 28 to 29% of patients become feces carriers and that 3 or 4% of all patients become permanent carriers. Another type of carrier is occasionally mentioned,—the healthy one, but in all probability he is a permanent convalescent carrier, once having had an unrecognized attack. Most carriers are women, and in the majority the feces are responsible. In less than 10% of carriers the urine alone is responsible. When the latter is the case greater numbers of bacilli are transmitted per carrier than when the bacilli are in the feces.

4. Milk and milk products may be infected either by carriers or by utensils washed in contaminated water. Chapin thinks that raw milk is not a good culture medium, owing to some inhibiting action of such milk on bacterial growth. He calls attention to the fact that milk epidemics are found in small communities, over short milk routes, in apparent substantiation of his belief.

5. Transmission by shellfish has received increasing attention of late. It has long been known that oysters and clams taken from areas polluted by sewage may transmit typhoid fevers, but in spite of ample laws with good attempts at enforcement, it is probable that such transmission still occurs.

6. Fruits and vegetables may be contaminated by human feces used as fertilizer, but this method of fertilization is rare in this country.

7. Soil becomes polluted by the deposition on it of infected feces and urine. This often results in the direct contamination of drinking water and food, and in indirect contamination of food through flies and fingers. The deposition of infected feces in an insanitary privy furnishes an excellent source where the fly may obtain infected material to convey to food. Such privies exist not only in rural districts but to some extent in cities where sewerage is available.

CONTROL

The first and most important feature in the fight against typhoid is the early diagnosis, and to obtain this, laboratory help is essential. Clinical diagnoses are made, but they are never early ones, being made generally after the clinical picture is complete. When a fever persists several days with malaise and diarrhea or other suggestive symptoms laboratory aid should be sought, if available, and the health department should provide such facilities. The Widal test is no longer universally available because of the prevalence of vaccination and also because there are now more diseases in this group than typhoid itself. Blood cultures and isolation of the causative organism from feces or urine are now so well established that no diagnosis of a typhoid fever should be made without such a positive finding, where a laboratory is available. Blood cultures are most commonly positive in the first week, while feces and urine are not generally positive before the 7th day. Examinations of several specimens of feces may be necessary in order to find the bacilli, for they die quickly in feces. Mild or abortive cases are easily missed or mistaken for influenza, acute articular rheumatism, etc. A diagnostic measure ordinarily available in hospitals only is the duodenal culture, the material being obtained by means of the Einhorn tube. This probably is the most certain diagnostic aid. In remote rural regions where prompt laboratory aid is not available the clinical diagnosis will have to be relied upon, and the earlier it is made the better, since infected urine and feces are particularly dangerous to others in such places.

Prompt notification of each case of typhoid fever, as prescribed by law is the point where the physician may first assist in the campaign for eradication. Each such report should result in a visit of a trained agent of the health department to the house where the case originated. This agent should give instruction in concurrent disinfection to the members of the household if the case is being treated at home, collaborating in this with the attending physician. In addition he should urge vaccination of contacts and be prepared to do it immediately on request; he should get specimens of feces and urine from contacts; and he should try to trace the infection.

The aim of all control measures is to prevent human feces from reaching the human mouth. Could this be accomplished, the typhoid fevers, many of the dysenteries and diarrheas of adults and children, and Asiatic cholera would disappear. If all human excreta could be disposed of in a safe manner there would be a marked decrease in typhoid as well as in the other diseases named and in hookworm disease, and certain other parasitic infestations. The problem of preventing the typhoid fevers has two aspects,—the community and the individual. Up to the present time community measures have accomplished more relatively, than individual. Practically all cities have obtained pure water supplies, but the large ones, with more financial resources have been able to provide themselves with more elaborate water purification plants. In addition they are able to employ experienced health officers with well-trained assistants who exercise a rigid inspection service to keep the milk and shellfish industries clean. Therefore, at present, the chief source of typhoid in the

cities is the rural districts which urban dwellers frequent on their summer vacations. The following are the control measures for which the community is responsible:

1. Purification of water supplies and their constant supervision, with frequent laboratory examinations, and the exclusion of contaminated supplies until disinfected.
2. Careful inspection of dairies and pasteurization of all milk except it is certified, and exclusion from distribution of all suspected supplies until some other cause is shown for the existing epidemic.
3. Supervision of the food supply of the community. This includes an inspection of restaurants with special reference to the examination of food handlers in order to exclude carriers. It also includes keeping contaminated shellfish out of the market.
4. Prevention of fly breeding.
5. Safe disposal of sewage and the abolition of the insanitary privy as well as of the so-called sanitary ones in the districts served by a sewerage system.
6. Supervision of all carriers and their exclusion from work as food handlers.

As to individual measures, these may be studied more in detail, for it is here that the practicing physician is able to co-operate most fully. First of all, the patient should be isolated in a well-screened room. Hospital conditions are best unless home arrangements are entirely adequate. Concurrent disinfection is very important, and is complex. The representative of the health department, even if he leaves printed instructions cannot in his few visits explain all the measures to be taken. And generally, in communities where the health department is able to send agents, there is abundant hospital service. Concurrent disinfection therefore generally depends on the physician who, during his daily visits can do much in the way of giving instructions and correcting wrong methods, toward protecting other members of the community. The chief control measures which the physician is best situated to supervise are the following:

1. Isolation of the patient in a fly-proof room.
2. An attendant or attendants to give exclusive attention to the patient. This attendant should understand the need for, and practice extreme cleanliness.
3. Vaccination of all those who have probably been exposed.
4. Disinfection of feces, urine, and burning of sputum and food remnants.
5. Use of individual eating utensils.
6. Disinfection of bedding and other linen before sending to laundry.

CARRIERS

It is comparatively simple to prevent the extension of typhoid fever from patients. They are in bed, and under control, and concurrent disinfection even though it is not perfect accomplishes much. But the question of the ambulant or abortive unrecognized case, of the typhoid case before diagnosis, and of the so-called healthy carriers is far from solution. It is manifestly impossible to make systematic searches for carriers in a community, so they are discovered accidentally, only, generally while making epidemiological studies of outbreaks or of repeated cases in some particular locality. If it were possible to secure Utopian conditions where everyone washed his hands after defecating or micturating, and before eating, and kept his hands from his mouth, nose, and eyes, typhoid fevers would be much more rare; but this is as difficult of attainment as the prevention of the distribution of saliva.

A certain proportion of carriers may be kept under observation from the time of their incipiency. If all patients before discharge were to have careful bacteriological examinations of feces, urine, and bile, many who become unknown carriers might be kept under supervision. It is not possible to quarantine known carriers but if they are registered and kept from handling food the danger from them is a minimum. Garbat's excellent work showed that even feces cultures fail to detect all carriers. In his series 15% of those who had three consecutive negative stool cultures were found by bile culture methods to be carriers. The method of getting bile for culture is the duodenal tube. Occasionally there is a pure intestinal carrier who will have negative bile cultures. All typhoid convalescents still under observation, as well as carriers should be warned not to go anywhere where they could possibly contaminate a water supply. They should be instructed that until discharged from observation all their feces and urine should be disinfected. Those discharges should be examined bacteriologically and three consecutive negatives obtained, at 48 hour intervals, before discharge of the patient. Wherever possible—and this should always apply to hospitals—two negative consecutive bile cultures, most certainly at least one, should also be made, if feces and urine have been negative, before discharge. Permanent carriers thus located should be registered at the health department and given the following instructions:

1. Avoidance of any employment in connection with preparation and handling of any food whatsoever.
2. Semi-annual reporting to the health department in person, giving information as to his activities, and leaving specimens for examination.
3. Advice concerning disposition of feces and urine, if insanitary privies are used.
4. Necessity of personal cleanliness in such matters as washing the hands, the use of a personal towel, and the disinfection of his linen to avoid infecting those who wash the latter.

Vaccination with a triple vaccine composed of dead typhoid, paratyphoid A and paratyphoid

B bacilli is so efficacious an individual prophylactic that all should be urged to take it. Since the war, epidemics have been reported in this country and in others where those who had been vaccinated while in service escaped infection although exposed to identical conditions with those attacked. Vaccination does not protect against massive doses, and therefore even if it were universal it would not be permissible to relax the other precautionary measures. All those coming in contact with cases or carriers should by all means be vaccinated. Also those who travel about (and who in this day of the automobile does not do so?) and are often forced to eat and drink under conditions not above suspicion. In a word, all should be vaccinated before the age of ten and revaccinated several times during the period of greatest susceptibilty. There were reported in Massachusetts during the seven years 1917-1923 6718 cases of typhoid. According to Department of Health records 172 of these had been vaccinated against typhoid. It is not improbable that there were really more, for about a third of the histories of cases were not good, so no comparison as to typhoid morbidity among the vaccinated and unvaccinated can be made. But of these 172 eight were fatally infected, a case fatality of 4.7%. Of these eight, two were in age group 10-19, four in 20-29, and one each in 40-49 and 50-59, and a case fatality of 14% would have been expected based on the figures in table 18. Of these 172 vaccinated cases, the records showed that 44 had been vaccinated while in the Army. Two of these men died of typhoid, one in 1919 and the other in 1923. Both were in age group 20-29 where a case fatality of 11.3% is expected (table 18). The actual case fatality is 4.5%. It is not known just when vaccination was given, but it must have been in 1917 or 1918 for the ex-service men.

As in the other communicable diseases a campaign of education of the public should be conducted, along the following lines:

1. That the typhoid fevers are preventable, and that they are just as much to be feared as is Asiatic cholera, which, because of its shorter and more fatal course, is much more dreaded.
2. That all substances which are intended for use as food should be protected from contamination with human excreta, or should be subjected before consumption to some process which kills the organisms. The individual is dependent on the community, unless he lives in a rural district, for pure water, milk, and shellfish, but even then he must protect his food after he gets it or the good work of the supervising authorities will have been done in vain. Keeping flies out of the home is important in this connection.
3. That excreta should be disposed of in a sanitary way. If a sewerage system is not available the privy or cesspool should be sanitary in construction.
4. That water not known to be safe should be avoided.
5. That personal cleanliness, particularly in food handlers, manifested by washing the hands after each visit to the toilet and before meals, and by keeping the hands from the nose, mouth, and eyes, is a very essential prophylactic measure.
6. That vaccination is the best individual protection.
7. That the thorough cooking of meat is a special measure necessary to prevent a certain subgroup of the typhoid fevers, and that this also prevents certain infestations.
8. That reporting of mild cases direct to the health department, in cases where the family does not desire a physician or is unable to go to the expense of employing one, is an aid to the health department as well as protection to the other members of the family and to the community in general.

(To be continued)

MEDICAL PROGRESS

PROGRESS IN OBSTETRICS

BY ROBERT L. DE NORMANDIE, M.D., F.A.C.S.

THE SEVERE ANAEMIAS OF PREGNANCY AND THE PUERPERIUM

LARRABEE[1] reports 17 cases of severe anaemia beginning during or shortly after pregnancy not due to obvious complications, but apparently resulting from the gravid state *per se*. He reports in detail with the blood findings in an accompanying chart of 7 cases where the blood picture was of a secondary anaemia, 8 cases with the blood picture of pernicious anaemia, 1 case with the blood picture of aplastic anaemia, and a final atypical case with recovery after splenectomy.

Larrabee goes into the diagnosis of this condition and its relation to other diseases, and warns the obstetrician confronted with a case of apparent sepsis in which pallor is a marked feature to make a thorough study of the blood. If the anaemia is of the secondary type with polymorphonuclear leucocytosis present, it will point strongly toward sepsis. But if the picture is that of pernicious anaemia, and particularly if there is also leukopenia, immediate transfusion should be done. If there is a prompt drop of temperature and progressive improvement after a single transfusion, infection as a cause is most improbable, for in real septic infections transfusion has no such influence.

In regard to the prognosis, Larrabee states that with transfusions and other modern methods available, most of those with anaemia of the

more severe types will recover and will even go through subsequent pregnancies without recurrence. If the disease becomes severe early in pregnancy, the patient will probably abort.

In the treatment, transfusion has made an enormous difference in the outlook for these patients. Even the cases with a secondary picture may need it. When the pernicious picture is recognized, they should have it without delay. Probably a single transfusion will suffice in the majority of cases, and recovery is sometimes marvelously prompt. Splenectomy as a routine procedure is not advocated, although it was attended with brilliant results in one case reported. In cases originating early in pregnancy the question of emptying the uterus arises. In mild cases of the secondary type it is surely justifiable to let pregnancy proceed. Larrabee agrees with Rowland, who says that any case bad enough to require transfusion is bad enough for the termination of pregnancy. The proper course, Larrabee however feels, must depend upon the merits of the individual case, having reference to the type and the severity of the anaemia, the stage of pregnancy and the viability of the fetus.

The question arises in regard to future pregnancies, and he reports one of his cases that has been through one subsequent pregnancy and another who has had two subsequent pregnancies.

PROLIFERATIVE GINGIVITIS OF PREGNANCY

Monash[2] reviews the disturbances which take place in the mouth about the teeth during pregnancy, and reports especially on the type of gingivitis which appears during pregnancy and goes away spontaneously after delivery. He reports six cases with photographs of the condition and photomicrographs of sections from the tissue removed.

He concludes that these tumor-like masses may begin to form at variable times during pregnancy and increase much in size unless treatment is instituted, and spontaneously are diminished in size or disappear completely after delivery. The growth is usually accompanied by a generalized gingivitis and is inflammatory in character. He concludes that there is no gingivitis peculiar to and found only in pregnancy, and in the treatment the elimination of all irritating factors and if necessary excision of the growth after delivery may be necessary.

FETAL HEART SOUNDS DURING LABOR

Bartholemew[3] has studied 200 private consecutive obstetric cases in which the fetal heart sounds were noted at intervals of one-half hour to one hour in the first stage and from five to fifteen minutes or less during the second stage. He summarizes his paper by saying that as the heart rate was found to be slowed from a normal rate of 120 or above, to 100, or further slowed to a rate persisting below 100, there was an increasing proportion of babies showing partial asphyxia at birth, and an increasing incidence of intra- and postnatal deaths from asphyxia, and he concludes that the fetal heart rate is usually from 125 to 145 during labor, tending to be somewhat slower in the second than the first stage. A rate of 120 per minute is the low limit of normal. A fetal heart rate of 100 to 120 strongly suggests some interference with the circulation, and is an indication for more frequent auscultation and for making preparations for possible delivery. A fetal heart rate persisting below 100 and tending to a progressive decrease is an indication of impending asphyxia and necessitates immediate delivery. A rapid fetal heart rate of 160 or above is not an indication of threatened asphyxia and does not require interference.

He finally concludes that the physician should be in attendance at the end of the first and throughout the second stage and auscult the fetal heart sounds at intervals of five to fifteen minutes or less in order to detect evidence of threatened asphyxia.

THE SIGNIFICANCE OF THE PASSAGE OF MECONIUM DURING LABOR

Schulze[4] has a short historical review of the subject of the passage of meconium during labor, and then goes on to the analysis of 5,000 deliveries in the University of California Hospital. In this series meconium appeared in the amniotic fluid in 3% of the cases.

She analyzes the question of whether the meconium was passed some time prior to labor, or whether it was passed during the process of birth, calling attention to the fact that fresh meconium is flaky and of the typical greenish-brown appearance, while old meconium imparts a uniform greenish tinge to the amniotic fluid. Schulze also considers the possible effect of anaesthetics on the passage of meconium, but comes to the conclusion that the anaesthetic has no effect.

Her further conclusions are that the passage of meconium during labor is in the large majority of cases entirely independent of fetal asphyxia. The passage of old meconium at the time of rupture of the membranes is of no prognostic value as to the later development of asphyxia. The cause of the passage of meconium in cases without asphyxia can not be definitely stated, but it is entirely independent of maternal conditions or of drugs administered to the mother. A strikingly large proportion of overlarge children pass meconium, in most cases without serious significance. Fresh meconium appearing with rupture of the membranes may or may not be associated with asphyxia. In cases associated with asphyxia changes in the

fetal heart are invariably present, and the latter therefore should be the sole guide regarding the necessity for operative interference.

PRESENT STATUS OF THE INTRAVENOUS USE OF MERCUROCHROME

In a short article Piper[5], who has been one of the chief advocates of the intravenous use of mercurochrome, gives a very fair summary of the present status of the use of that drug, and comes to the following conclusions: (1) its use is not unattended by danger; (2) were we able to use larger doses safely we could unquestionably temporarily sterilize the blood stream; (3) the use in smaller doses as a prophylactic measure in the puerperal state and in other conditions where septicemia is imminent should have careful consideration; (4) its use in puerperal septicemia *per se* is most discouraging; (5) no intravenous medication will avail without common sense surgery.

BANDL'S RING AS A CAUSE OF DYSTOCIA

Michael[6] has a short review of the previous literature on cases of dystocia caused by Bandl's ring, and reports four cases of his own that gave difficulty. In the statistical inquiry as to the cause of this condition, there apparently is no definite reason for its occurrence in a multipara or in a primapara. The age, the type of pelvis or the presentation apparently are not causes for the occurrence of the condition. He states that early rupture of the membranes is generally considered as a predisposing cause.

In regard to the character of the pains, the two outstanding features were the presence of an increased subjective pain varying in its site, but most frequently described as being low in the back and irregular, with ineffectual contractions usually extending over a long period of time. In many of the cases that he reviewed, measures had been employed to expedite labor and unsuccessful attempts at delivery had been made before the diagnosis of a Bandl's ring was made.

The ring he finds situated in various parts of the uterus, some below the presenting part, some about the neck, or about the thorax or the shoulders. The fetal mortality in this condition he states is very high, running from 40% to 80%, and that the maternal mortality according to the method of delivery runs from 20% to 33%.

He reports four cases where the Bandl's ring was supposed to be the cause of the difficult labor. He suggests for this condition the adoption of two terms—"persistent retraction ring of Bandl" and "tonic contraction ring of Bandl", the former applying to cases where in addition to the ring general retraction is present, while in the latter Bandl's ring alone exhibits contraction. He states that Caesarean section as a method of delivery for this complication carries a high maternal mortality, and success in the management of this condition depends on early recognition which presupposes early exploration of the lower uterine segment.

RECTAL ETHER ANALGESIA IN CHILDBIRTH

Harrar[7] reviews the use or morphine and magnesium sulphate hypodermically followed by the colonic instillation of ether in oil for the lessening of the suffering of women in labor. This method was first brought forward by Gwathmey in 1923.

Deep intramuscular injection of one dose of morphine with magnesium sulphate in solution to prolong its action is given and the magnesium sulphate later is repeated alone. One to two hours following this a rectal instillation of ether in olive oil is given. Harrar states that the effect is a semi-narcosis and amnesia with great relief of pain, and when not used too early does not inhibit the progress of labor, even in the perinaeal stage. Harrar does not pretend or promise a painless labor by this method.

The drugs used are 1/6 or 1/4 grain of morphine sulphate with 2 c.c. of a 50% solution of magnesium sulphate. The magnesium sulphate is used alone when repeated, and the retention enema is made up of quinine alkaloid grains 20, alcohol minims 40, ether ounces 2½, olive oil up to ounces 4. If the quinine alkaloid is not obtainable, he uses quinine hydrobromate grains 20, alcohol drams 3, ether and olive oil the same as before. The magnesium sulphate is given intramuscularly and the rectal instillation is given by a small rubber catheter, size 20 or 22 French. A glass connecting tube is attached to the rubber catheter and the rubber tubing in order to enable the observer to note when the last of the fluid leaves the funnel.

The treatment should not be started until the patient is in active labor, and the pains are coming at least at five minute intervals and lasting forty seconds. By waiting until the labor is well established, one eliminates cases of so-called "primary inertia." In a primipara Harrar states that it is best to wait until the cervix is fairly well effaced and dilated to a diameter of at least two finger tips, but in a multipara it can be started before this degree of dilatation is reached, if the pains are of proper length and strength. An enema is given and then the intramuscular injection is given. One-half hour after the primary injection of morphine and magnesium sulphate is given, a second intramuscular injection of 2 c.c. of a 50% solution of magnesium sulphate alone is given. Harrar states that this is given no matter what the effect of the primary injection is, for this second dose tends to prolong the action of the morphia. If the effect of the morphine and magnesium sulphate is sedative, the rectal instillation is withheld until the effect of the former is almost worn off. If, how-

ever, there is no relief from the morphine and magnesium sulphate within one-half hour of the second injection of the magnesium sulphate, the rectal instillation is given.

The rectal instillation is given as follows: the contents of the bottle containing the ether mixture and a bottle containing two ounces of plain olive oil are warmed by letting them stand a few minutes in warm water, first loosening the corks. The patient is then placed on her left side, and vaseline is liberally applied around the anus, so that the ether mixture if expelled will not irritate. The patient is told not to press down during her pain, but to breathe deeply with her mouth open. One ounce of the warm plain olive oil is poured into the funnel, the air is expelled and the catheter is then introduced into the rectum about four inches. Harrar warns if the fetal head is well down into the pelvis the gloved finger must be inserted into the rectum along with the catheter to insure its passage past the head. The warm ether mixture is then allowed to run into the rectum very slowly. At no time is the funnel allowed to become entirely empty. As the last of the ether mixture is about to leave the funnel, an ounce of warm olive oil is poured in. Pressure is then made on the anus with a towel during the next two or three contractions, with the pinched catheter in place. The catheter is then gently withdrawn. If a uterine contraction comes during the instillation, pressure must be made against the anus with a folded towel.

Immediately after this injection is completed a third dose of magnesium sulphate alone is given, in order to prolong the action of the ether. The patient is then allowed to turn upon her back or assume whatever position is most agreeable to her. Harrar warns that vaginal or rectal examinations must not be made too soon after the instillation.

Within fifteen or twenty minutes one can smell the ether on the patient's breath, she becomes flushed, and occasionally has a little of the excitability of the first stage of ether anaesthesia. Consciousness is not entirely lost, the patient becomes drowsy and sleeps lightly between the pains. Harrar warns that the progress of labor must be closely watched for the presenting part is frequently bulging the perinaeum without any apparent increased effort on the part of the patient. When the effect of the first ether instillation is worn off, usually in about two to three hours, a second and even a third instillation may be given at intervals of three hours or more. The first instillation contains 20 grains of quinine, but in subsequent instillations only 10 grains is given. At each subsequent instillation one intramuscular injection of 2 c.c. of 50% magnesium sulphate is given.

Harrar believes that this method is the least likely to prolong labor if not used too early, and it is without danger to either mother or child. He states it can be used both in normal labors, in cases of dystocia, in labors induced with bags, in toxemias, in cardiac cases and in women in labor with acute pulmonary conditions to whom inhalation anaesthesia might be disastrous. Harrar finds that it is applicable to about 70% of all labors in hospital practice. It can be used in the home with equal facility, and is also being used by the outpatient staff of the hospital. Harrar has found no increase in operative deliveries, and there has been no increase in postpartum hemorrhage or in the stillbirth rate.

Harrar refers to certain disadvantages, but states that most of them are due to false technique. The most evident of these is the occasional expulsion of the rectal instillation. Frequent extrusion of small quantities of fecal matter makes it more difficult to keep the field clean in the perinaeal stage, but this is obviated if the cleansing soap suds enema is completely expelled before the rectal instillation is given.

Harrar states that he is convinced that it is the safest and most effective method for the relief of pains of childbirth over a period of hours that has been so far devised, but he warns that it would be a great mistake to promise the patient that she would be entirely relieved of all suffering.

THE INTRAMUSCULAR INJECTION OF MAGNESIUM SULPHATE FOR THE CONTROL OF CONVULSIONS IN ECLAMPSIA

Dorsett's[8] paper is based on 38 cases where magnesium sulphate was used by injecting it deep into the gluteal muscle. Dorsett started using a 50% sterile solution of magnesium sulphate, but changed to a 25% solution, and he is now using a 25% solution put up in 15 c.c. ampoules.

He is not governed by the blood pressure or by the body weight of the patient when injecting the solution, but gives as an initial dose 15 c.c. in the buttocks. He does not hesitate to give a similar dose every hour if necessary. The dosage is guided entirely by the frequency and the severity of the convulsions. Dorsett states that in the cases that he has thus treated there has been no respiratory disturbance of any kind, but he has been prepared at all times to give an injection of 1 c.c. of calcium chloride intravenously should any patient show any ill effects from the magnesium sulphate. He states that several of the cases have received as high as 100 c.c. of the drug within 20 hours without any perceptible reaction.

He states that the action of the drug varies in different cases, having a much more rapid effect in those cases where the patient receives the injection early and has had only a few convulsions. In several cases there were no more convulsions after the first injection. In the

majority of cases there was a marked relaxation of all the voluntary muscles, but if the patient is in labor there is absolutely no effect upon the uterine contractions, and the drug has no effect upon the blood pressure or pulse rate. Dorsett noticed no purgative effect, but he believes that it has a diuretic effect.

In this series of cases magnesium sulphate alone was used to the exclusion practically of all other forms of medication. He presents a table showing the number of cases with the number of convulsions, the amount of magnesium sulphate given and the number of convulsions which occurred after delivery.

He comes to the following conclusions: 1. The intramuscular injection of 25% magnesium sulphate in 15 c.c. doses will control the convulsions of eclampsia. 2. Fifteen c.c. as an initial dose is not toxic. 3. This method of treatment not only relaxes the patient but decreases the intracranial pressure by relieving the cerebral edema, stimulates diuresis, and aids in the diminution of the general edema. 4. Eclampsia is primarily a medical condition and secondarily an obstetric problem. 5. Any method for the hastening of delivery of the patient is not only unnecessary, but adds greatly to the morbidity of the case.

SYPHILIS AS THE CAUSE OF STILLBIRTH

Taylor[9] has studied a series of proven syphilitic cases where spirochaetae were present in an attempt to arrive at some method of diagnosis when the spirochaetes are not found or even microscopy is not available. His paper is the result of study of 23 cases of syphilitic stillbirths and 66 cases of stillbirths as the result of difficult labor, placenta praevia, accidental hemorrhage and the like.

He comes to the following points that are of value in making a diagnosis of syphilis in the stillborn when spirochaetes have not been found or it is not practical to search for them. In favor of syphilis: (a) enlargement of the spleen (.45% of the body weight may be taken as a "border-line"); (b) the presence of chondro-epiphysitis; (c) a positive Wassermann reaction in the mother. Against syphilis: (a) no maceration of the fetus; (b) the fetus reaches full time. No evidence can be obtained from (a) the weight and length of the fetus; (b) the relative weight of the liver, kidneys or placenta.

OBSTETRICAL ROENTGENOLOGY WITH SPECIAL REFERENCE TO ANENCEPHALY

Doub[10] states that in the last few years there has been a decided impetus for the use of the X-ray in obstetrics, and in many clinics it is now almost a routine procedure in all cases suspected of variation from a normal pregnancy either from the standpoint of the fetus or of the bony conformation of the maternal pelvis. He states that the fear in some quarters of causing damage to the fetus has acted as a deterrent in the use of the X-ray, but he feels that this fear is unjustified.

He states that from the point of view of teaching, X-ray work in obstetrics has great possibilities, both from the standpoint of the medical student and the interne, and for the obtaining of a collection both of normal and abnormal conditions. Doub has special reference to the study of anencephaly, fetal death, hydrocephalus, abdominal pregnancy, multiple pregnancy, malformations of the fetal skeleton and X-ray of the pelvis.

He reports 7 cases of anencephaly which were diagnosed by the X-ray before birth. In making the diagnosis of the death of the fetus, he quotes Spalding as saying the overlapping of the fetal bones to be a pathognomic sign of intrauterine death, and he reports two cases which showed this overlapping of the cranial bones and the diagnosis of death of the fetus was made. He also reports a case of hydrocephalus diagnosed before birth.

THE INCOMPATIBILITY OF PREGNANCY AND FIBROIDS OF THE UTERUS

Mosher[11] has an interesting review of pregnancy and fibroids, and states that the striking fact that there is an incompatibility of these two conditions is demonstrated by the following facts: (1) the frequency of sterility when fibroids are present; (2) the tendency to abortion and premature labor; (3) the stormy experience which these patients endure in pregnancy; (4) the possibility of degenerative changes which may occur. He reports six pregnancies complicated by fibroids.

He concludes that pathology of myoma and fibromyoma in pregnancy will be shown by pain, hemorrhage and signs of degeneration, evidence of the latter being a rise in temperature or a high leucocyte count. If the tumor be situated at the brim of the pelvis so as to constitute an absolute or a relative dystocia, operation is to be considered, either a myomectomy or a hysterectomy, according to the condition encountered. Abortion is not to be considered as an expedient in a case of pregnancy complicated by fibroids. Caesarean section is done in many instances without proper indication. The majority of fibroids in conjunction with pregnancy run a favorable course after the immediate danger of postpartum hemorrhage. The tumor rapidly diminishes in size and in some instances has seemed to disappear. Each case must in every instance be individualized, and the result is dependent on the judgment and skill of the operator.

THE DEVELOPMENT OF PRENATAL CARE IN DETROIT

Welz[12] reviews interestingly the attempt of the city of Detroit through its Department of

Health to decrease the maternal and infant mortality which results from neglected pregnancy and delivery. The death rate from childbearing in Detroit has averaged 6.75% for a number of years, and Welz states that this appalling death rate intimately associated with childbearing is sufficient to demonstrate that childbearing is a public health problem.

In 1911 the Department of Health started a prenatal clinic, and now there are seven such clinics. In 1918 the Department of Health provided a maternity pavilion in a hospital, and by this means the city has provided care for indigent pregnant women from the time of conception through pregnancy, delivery and the postnatal period. Over 1300 patients are cared for in this pavilion annually. Welz has tables which show the improvement of mortality statistics in stillbirths and neonatal deaths when prenatal care has been given the patients.

At one station 14% of the patients that applied for care showed syphilis, and as soon as a positive diagnosis of syphilis was made the patient was sent to the venereal clinic of the Department of Health for intensive treatment. Welz shows an interesting table of the improvement of infantile death rate under this intensive treatment. Marked cases of toxemia of pregnancy ran from 3% to 4%, and Welz considers this low incidence due to the effect of prenatal control. Six and six-tenths per cent of the women in one station were found to have heart lesions. The incidence of tuberculosis in this clinic was 8.6 per 1,000. The fact that it was so high was because all pregnant tuberculosis patients are referred to the clinic for care from the tuberculosis clinic of the Department of Health. Five per cent of all mothers in one station had pelvic contraction sufficiently marked to make normal delivery problematical. The nutrition of the mother was carefully looked after, and the importance of breast feeding was thoroughly taught to the individual patients. Careful prenatal records were kept and general health coöperation was carried out.

At the present time in the prenatal clinics the Department of Health registers 6% of all pregnant mothers in the city. These, however, are practically only the indigent class. Welz estimates that approximately 20% of the mothers of Detroit receive adequate prenatal care, and these include the wealthy who pay for their care and the poor who attend these clinics. He states that the reason that the other 80% is neglected is two-fold—neglect on the part of the family physician and negligence on the part of the expectant mother.

Welz ends his paper with the following comment: "Prenatal care is in its infancy. When properly understood and generally followed, it will be the greatest aid in making childbirth safer for mother and child. The objective of the medical profession should be to train its members to give modern prenatal care, and to educate all people as to the benefits of this care. There must be close coöperation between the medical profession and the public in the furtherance of prenatal care. Lay organizations are necessary to induce the public to demand good medical care during pregnancy. More and better maternity hospitals are needed to provide modern facilities for childbirth for women who have had adequate prenatal care."

CAUSES AND PREVENTION OF MATERNAL MORTALITY

Morris[13] in a long, painstaking article, goes into the causes and prevention of maternal mortality in Australia. In reading the article one is struck by the similarity of the problems that Australia is facing with ours here in this country. He first presents some statistics showing the maternal mortality rates in Australia, then compares the Australian statistics with those in other countries, using the same statistics that have been used in this country. He then takes up the general causes of maternal mortality, the character of the care bestowed upon the mother, the unsatisfactory part that the midwife plays, and he shows that the Midwives Act has not, in his opinion, brought about the diminution of deaths from sepsis as it was expected to do.

He takes up in turn the following subjects which have a distinct bearing on maternal mortality: abortion and miscarriage, venereal disease, constitutional diseases, the employment of women, and insanitary conditions. He then goes into a prolonged and careful study of puerperal septic infection, the causes and prevention. He then takes up the deaths from puerperal albuminuria, difficult labor and puerperal hemorrhage.

In studying the prevention of maternal mortality, Morris states that no one cause can be singled out as the determining factor in the production of maternal mortality. He regards the problem as extremely complex and it is only by controlling all the factors and directing them into beneficial channels that we shall eventually attain the objective aimed at—the prevention of all preventable deaths and injuries.

He then goes on and pleads for an improvement of the care bestowed upon the mother, and states that the obvious defects in this care are not so much due to the lack of skill on the part of the medical practitioners, but rather to the latter not thoroughly and effectively utilizing the skill and knowledge which they possess. He urges an improvement in the teaching of obstetrics and a far wider clinical experience. He urges that the education of the public is one of the several means to the end in view, and will involve the coöperation of governments, health departments, medical and nursing professions.

Morris states that educational efforts can not be expected to produce immediate results, and he urges that these educational efforts be broad in conception, individual in incidence, and prolonged and persistent in time. He states that the public mind will remain in the present disinterested state until it is compelled to realize that much of the present morbidity and mortality is not only preventable but also is worth preventing. When the public is convinced upon these points, it will soon demand redress. The question will enter the arena of practical politics, financial and other difficulties will be surmounted and eventually, Morris states, we shall have a midwifery service fitted for its task, the safeguarding of the health and wellbeing of mothers.

MATERNAL MORTALITY

Woodbury[14] has brought into available form much material from many countries that has a bearing on the study of maternal mortality. In this study he takes up in turn the definition and measurement of puerperal mortality, the deaths from puerperal causes in the United States, showing the margin of error that is present, the pathological causes of puerperal mortality, studying the primary causes and then the contributory causes, factors in puerperal mortality, the stage of pregnancy, stillbirths, complications of pregnancy or confinement, obstetrical operations, the time from childbirth to the death of the mother, the age of the mother and the order of birth, the earnings of the father, the color and the nationality of the mother, and the conditions in the urban and rural districts.

In the pages covered by the heading "Trend of Puerperal Mortality in the United States," Woodbury states that the figures presented with their analysis show that there is a strong presumption that the mortality from puerperal septicemia has actually decreased throughout the period from 1900 to 1920, while that from other puerperal causes has remained approximately the same.

In the chapter on the comparison of the maternal mortality in the United States and certain foreign countries, occur the figures that have given rise to so much bitter debate on the value of such statistics. Woodbury shows in this chapter how these mortality rates vary in the compiling from corresponding rates in our own country, and the significance of the differences of these rates. He makes it perfectly clear that there is a decided difference in the compiling of these rates, but when it is known wherein the differences are, the comparability of these rates is justifiable.

Woodbury then takes up the preventability of puerperal mortality, going fully into puerperal septicemia and other puerperal causes. In the matter of prevention of puerperal mortality, he covers the question of protective legislation, which includes (1) the regulation of obstetrical practice, (2) the licensing of public and private hospitals and maternity hospitals, (3) social hygiene legislation and the control of venereal diseases, (4) reportability of puerperal septicemia. He gives tables on the provisions for maternity care in the United States, the proportion of physicians to the populations in urban and rural areas, the number of midwives authorized to practice and the percentage of births attended by midwives. In the question of governmental responsibility, Woodbury shows what measures have been taken to provide adequate maternity care in this country and in other countries.

He ends his article by the frank statement that in many points in his paper the inadequacy of information is evident, stating that statistics of puerperal mortality are not available for the whole country but only for the death registration area, and even for this area they are subject to qualification and interpretation. He shows clearly in what group information is lacking, and states that only when such data are available will it be possible to judge accurately the nature of the problems of puerperal mortality and morbidity and the best methods of reducing them to a minimum.

The pamphlet is a clear statement and analysis of the statistics which are now available in various forms in this country, brought together and impartially studied. There is no question but that any set of statistics such as these are can be interpreted differently according to the person who interprets them, but it seems to the reviewer that Dr. Woodbury has placed before the country a wealth of material in a most available form that will do much to help the entire situation.

The end of the pamphlet is taken up with appendices and general tables. In Appendix A are the rules for the classification of puerperal causes of death in use by the Bureau of the Census; B shows tables on birth registration; C, tables on the registration and laws regarding stillbirths; D, on the comparability of maternal mortality rates in the United States and certain foreign countries; E, a summary of the laws and regulations governing midwives in the United States; F, concerning midwives in certain foreign countries; and finally, there is a very complete index of the entire pamphlet.

Single copies of this publication may be obtained free upon application to the Children's Bureau, and to those physicians who are interested in the study of maternal mortality it will prove a most valuable document.

STANDARDS OF PRENATAL CARE

The Children's Bureau[15] has recently published an outline of Standards of Prenatal Care for the use of physicians. The pamphlet states

that all pregnant women should be under medical supervision during their entire pregnancy, for it is only by careful routine prenatal care that pregnancy and labor can be made safer.

The Standards are in the form of an outline, which takes up the patient's past history, the character of her previous pregnancies and labors and her present pregnancy. The outline then advises the physician to proceed to a physical examination, the schedule of which calls for a complete physical examination, including a vaginal examination, pelvic measurements, the taking of a blood for the Wassermann reaction, and urinalysis. If a pregnancy is determined the outline advises the routine to be followed in the giving of minute instructions to the patient in the hygiene of pregnancy.

The pamphlet is accompanied by a form of pregnancy record which it is suggested for all physicians to use in their private work. These forms may be obtained from the Superintendent of Documents, the Government Printing Office, at five dollars a thousand. Physicians may obtain a copy of the Standards by writing to the Children's Bureau at Washington.

The bulletin covers the essential points in prenatal care which all physicians should be called upon to give their patients, and if all physicians followed the outline of these Standards unquestionably there would be a marked improvement in the obstetrical work that is done throughout the country.

MATERNAL MORTALITY IN MASSACHUSETTS

In a short paper the physicians[16] of the Division of Hygiene of the Massachusetts Department of Public Health give the results of analysis of 984 deaths in the puerperal state which occurred in Massachusetts during 1922 and 1923 among women six months or more pregnant from causes immediately related to pregnancy or childbirth. The tables presented give some interesting information on the causes of death of these patients.

One interesting table shows that of the patients delivered in hospitals, one-half of them were rushed in as emergency cases after serious complications had arisen. A table also shows that of the 204 Caesarean sections performed, 133 of them were done as an emergency measure.

In the table of the causes of death, puerperal infection accounted for 223 deaths, toxemia for 217, and hemorrhage for 129. These three causes of death which to a great extent are preventable are responsible for 58% of these deaths. Of the deaths analyzed, which total nearly 1,000, there were only 35 autopsies, showing clearly the need of autopsies in obstetrical work. The prenatal care that these patients had is shown in a table, and it is evident from this table that there is no adequate prenatal care in 89% of the cases.

This paper is one of a series of papers that the Division of Hygiene is publishing on the causes of maternal mortality in Massachusetts. It makes clear how much the State has yet to do in the improvement of obstetrical practice.

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TROPICAL MEDICINE IN PORTO RICO

It was an auspicious day for Porto Rico when, last month, the School of Tropical Medicine of the university was dedicated at San Juan. It must also have been a great day for Dr. Bailey K. Ashford, the American Army doctor, who has done so much to relieve the peasants of the hookworm sickness, of which a thousand of them were dying monthly till he discovered the cause of their anemia. Dr. Ashford becames Clinical Professor of Tropical Medicine. The head of the school is Dr. Robert A. Lambert of the Rockefeller Foundation in Brazil. It is now sixteen years since an appropriation was made by the Government of Porto Rico for the study and prevention of transmissible diseases. Ten years later the Legislature created the Institute of Tropical Medicine and Hygiene. At the dedication exercises Governor Towner said:

From these beginnings has come the present organization of the School of Tropical Medicine, under the joint auspices of Columbia University and our own University of Porto Rico, enlarged, strengthened, and in a new and beautiful home. . . . We have practically eliminated smallpox and yellow fever and other diseases of the most deadly character, but we must extend the work of extermination until we are rid of the blight and curse of uncinariasis, malaria and all the others.—*New York Times.*

Case Records of the Massachusetts General Hospital

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICO-PATHOLOGICAL EXERCISES

EDITED BY R. C. CABOT, M.D.

F. M. PAINTER, A.B., ASSISTANT EDITOR

DR. HUGH CABOT WITHDRAWS FROM EDITORSHIP

Readers of the Case Records of the Massachusetts General Hospital will learn with regret of the retirement of Dr. Hugh Cabot from coeditorship of the series. For several years after becoming Professor of Surgery and later Dean of the Faculty of Medicine at Ann Arbor he generously carried a troublesome responsibility in the Case Records, in fine loyalty to a work in which he and his brother had coöperated since 1909. It is natural that he should find it impossible to continue to give time to rather taxing work so detached from his own direct interests. In fact we have been fortunate in recent years to have even a small number of his brilliant and keenly reasoned discussions. In his own interest we must accept his retirement; but we accept it as an irreparable loss to the Case Records.

CASE 12431

DYSPNEA AND SWOLLEN LEGS; CAUSE?

MEDICAL DEPARTMENT

An Italian farmer sixty-seven years old entered July 28.

For nine weeks he had been unable to work because of swelling of the legs and weakness. He had felt "sick", had got out of breath easily and had been awakened at night with attacks of orthopnea which forced him to sit up. His best weight was 160 pounds, his weight before the present illness 150, his present weight 175.

His family history was good.

His past history was negative. This was the first time he had ever gone to bed ill. He had had very rare sore throats. He urinated once or twice at night. He did not understand or speak English well, but the history was believed to be fairly reliable.

Examination showed a rather undernourished Italian with cyanotic lips and nose, breathing heavily. Teeth decayed. Marked pyorrhea. Moist râles at the left base. Maximal apex impulse of the heart visible in the sixth space 11 centimeters from midsternum, corresponding to the left border of dullness. The midclavicular line was 7.5 centimeters from midsternum. In percussion of the right border two changes in resonance were noted, one at eight centimeters and one at four. Supracardiac dullness 7.5 centimeters. A loud blowing systolic murmur masked the first sound over the entire precordia. At the first right interspace and along the left sternal border was an early blowing diastolic murmur, very loud, transmitted down to the apex of the heart. At the base there was also heard a loud rumbling diastolic murmur, not so prominent as the high pitched early diastolic. Blood pressure 155/65-165/60-142/38. The abdomen showed fullness and dullness in the flanks with fluid wave. There was marked edema of the penis, some of the scrotum, pitting edema of the shins and over the back and sacrum. The pupils, knee-jerks and ankle-jerks were normal.

The amount of urine was 32 to 50 ounces, cloudy at two of six examinations, dark at one, alkaline at one, specific gravity 1.015 to 1.025, no albumin or sugar, rare leucocytes at three of six sediment examinations. Renal function August 5 5 per cent., August 7 30 per cent. Blood examination showed 8,000 leucocytes, 58 per cent. polymorphonuclears, 4,390,000 to 5,432,000 reds, hemoglobin 75 to 85 per cent. Non-protein nitrogen 47 milligrams. Two Wassermanns strongly positive.

The temperature was 96.8° at admission, afterwards 97.3° to 99.7°. The pulse was 111 at admission, afterwards 70 to 92. The respiration was not remarkable except for one rise to 32 August 6.

Orders. July 28, digifolin grains six and digitalis grains three immediately, then digitalis grains three three times a day. Limit fluids to forty ounces. Soft solid diet. Morphia grain one-sixth s.c., repeat once if necessary for sleeplessness. (Not given.) August 1, potassium iodide ten drops t.i.d. Corrosive chloride of mercury tablet* three times a day. Digitalis one and a half grains a day.

By July 30 the patient was already looking better on rest and digitalis and was getting a diuresis. By August 6 there was more diuresis. His weight dropped to 134. August 27 he was discharged.

After leaving the hospital he remained in bed or sat up in a chair practically all the time. After October he was not able to leave the house because of weakness of the legs and shortness of breath on the very slightest exertion. He did not sleep well. His feet were slightly swollen from the time of discharge. After the middle of January his legs were quite badly swollen and he had slight tenderness in the right upper quadrant. At the time of his re-

*Corrosive chloride of mercury one-sixteenth of a grain, extract of licorice one grain; make one hundred tablets.

admission his legs were so weak that he could not stand.

January 18 he reentered the hospital.

On examination he was cyanotic, dyspneic and ill. Cervical, axillary and inguinal glands the size of beans. Dullness at the right base and moist râles at both bases. Heart sounds of fair quality. Apex impulse in the sixth space thirteen centimeters from midsternum, coinciding with the left border of dullness. Right border four centimeters. Supracardiac dullness 5.5 centimeters. A loud harsh systolic murmur at the second right interspace, with a loud middiastolic transmitted to the neck; also a loud diastolic and presystolic of about the same pitch and time at the apex. Electrocardiogram showed normal rhythm, rate 90, P-R interval .22 second, diphasic T_2 wave, small complexes throughout. Radials markedly palpable, temporals and brachials tortuous. Blood pressure 160/60 to 130/60 to 140/40. Abdomen full. Liver edge 3 centimeters down, slightly tender. Edema of the abdominal wall. Shifting dullness in both flanks. Edema of penis and scrotum and in the sacral region; marked pitting edema of the legs and feet.

Amount of urine 20 to 45 ounces, cloudy at one of eleven examinations, bile stained at one, alkaline at two, specific gravity 1.020 to 1.030, the slightest possible trace to a very slight trace of albumin at five examinations, bile at one, one to four leucocytes at five of eleven sediment examinations. Blood examination showed 6,200 to 21,200 leucocytes, 71 per cent. polymorphonuclears, hemoglobin 78 to 75 per cent., 4,224,000 to 6,400,000 reds, moderate achromia. Non-protein nitrogen 42 milligrams. Wassermann negative.

Dr. Paul D. White said in consultation, "Prognosis bad no matter what the treatment. Bed, digitalis, mercury and potassium iodide."

By January 20 the edema was largely gone. There was little other improvement however. January 25 he was put on the dangerous list. The following day he was irrational, trying to get out of bed. He made a little improvement toward the end of February, but by the middle of March was much worse. March 31 he developed a pulmonary infection and died.

Discussion

BY RICHARD C. CABOT, M.D.

NOTES ON THE HISTORY

Prima facie, this is the history of a cardiac case of the degenerative type in an elderly man. He begins with edema of the legs, then dyspnea, and finally orthopnea, and above all he gains weight, which probably means edema. I should say that it would be very strange if this case turned out to be anything other than a cardiac or a renal case, just from what these first lines give us.

NOTES ON THE PHYSICAL EXAMINATION

1. The heart is displaced downward at least one space. The meaning of the lateral measurement depends on how big a man he is. It might be normal. But the midclavicular line was seven and a half centimeters from midsternum, so that the left heart border was three and a half outside the midclavicular line. This case shows an unusually careful percussion. Anybody who percusses carefully will notice shades of difference with a "dull" area. Ordinarily we put down the limits of one or another tone and let it go at that, because most of us know that cardiac percussion is not of much use anyway. Seven and a half centimeters supracardiac dullness, if we take it seriously, is slightly increased. This is the sort of case where it would be likely to be slightly increased, so I am willing to take it, though I should not pay much attention to it if we had only percussion to go by.

2. We have abundant evidence here of aortic regurgitation, in the first place in the murmur characteristic in time and place, in the second place in a pulse pressure of over 100, which goes with a free aortic regurgitation. We certainly shall be very much surprised if we are wrong, after two such reliable physical signs, in saying this man has a leaky aortic valve.

3. What other cardiac lesions he may have I cannot say. Although a diastolic murmur backed up by pulse pressure is one of the most reliable signs we have in diagnosis, the systolic murmur is one of the most unreliable. It might mean aortic stenosis. It is not likely to mean that because of the large pulse pressure, a large pulse being generally excluded by aortic stenosis. It might mean a rough, dilated, sclerotic aortic arch. That is the commonest explanation for such a systolic murmur. It might mean a relative regurgitation through a loose mitral valve. I do not think we can explain it.

4. We have then a clear reason for this man's edema and dyspnea, and the case is clearly a cardiac case, as I guessed in the beginning. He has ascites and anasarca, which accounts for his increase in weight.

5. There is no fixation of urinary gravity at a low point. The non-protein nitrogen is essentially normal. There is no reason that I see to doubt that these are normal kidneys. I said at the outset that this was either a heart or a kidney case. I do not think it is a kidney case.

6. It is a normal blood. There is nothing here of any importance. It is merely a routine examination of the blood, showing what we should expect it to show and nothing else.

"Two Wassermanns strongly positive" links itself with the disease we have already suspect-

ed at the aortic valve, and makes us think that the cause of the aortic regurgitation is syphilitic aortitis.

7. There is no fever.

8. Corrosive chloride of mercury was given presumably for the syphilis which they thought he had.

9. Forty pounds of weight has run out of his kidneys and bowels. That is the best thing that could possibly happen to him. It is a striking diuresis.

10. He stayed here a month, got a good effect from the treatment, and he went out.

(What this abdominal tenderness meant I have no idea.)

We did the best we could for him in the summer, patched him up. He went out, kept quiet, but in spite of that the whole thing came back again and he returned within six months.

11. I do not for a moment believe that these glands have come since he was here before. Of course there are beans and beans. A Boston baked bean and a good-sized lima bean are different things. The question is, what kind of bean is meant. I suppose they thought they were good sized, too large to be normal. I should say a gland the size of a Boston baked bean is often normal.

12. The fluid in his chest is presumably part of his general dropsy.

13. If this second physical examination is to be taken literally, then his first heart sound has come back, which is queer. He had none before. But my guess is that somebody else listened. I never knew a first sound to come back under these conditions. If it is gone it is usually gone for good. The left border of dullness is two centimeters further out than it was before.

14. The examination is essentially the same as before except that there is a presystolic. Since the time of Austin Flint a presystolic murmur at the apex has been noted often in cases of aortic regurgitation, even though the mitral valve was believed to be sound, and has received the name "Flint murmur". That would be the guess I should make here in the absence of any rheumatic history or of any other signs pointing to the mitral valve.

15. I do not see that the electrocardiogram tells us anything we did not know before.

16. There was a marked increase of pulse pressure, corresponding to the Corrigan pulse and jumping arteries that we expect with aortic regurgitation.

17. The urine is again negative, I should say. I do not think that anything wrong will be found in his kidneys.

18. The count of six and a half million reds was probably due to cyanosis. I doubt the moderate achromia. It may be true, but I do not see why we should have it.

19. This time the Wassermann was negative. He has received treatment, presumably, that made it negative.

DIFFERENTIAL DIAGNOSIS

I think the notes at the end of the history are a little sketchy. He was two months in the hospital, and we know very little about him. He is said to have had a pulmonary infection. I do not think that makes any difference in our main diagnosis. I do not see how we can have any doubts of the main trouble: syphilitic aortitis, with retraction of the curtains of the valve. So that he has (1) syphilitic aortitis; (2) hypertrophy and dilatation of the heart; resulting from that (3) general passive congestion; resulting from that (4) dropsy of the legs, belly, chest; and death.

This is the main cause of death certainly. What else? His kidneys I have already said will be found sound. His liver will be found congested. His lungs will be found congested, with perhaps something more, because they say he had a pulmonary infection at the end, whether pneumonia or bronchitis we are not told.

Will he show any evidence of syphilis other than in his aorta? He has shown none in life. It is very common to have syphilis confined, so far as the pathologist can see, to the aortic arch. I believe that will be the case here.

Will there be anything wrong with the mitral valve? I do not think so, beyond the enlargement that goes with hypertrophy and dilatation. The presystolic murmur was of the "Flint" type. Aortic stenosis? I think not.

This is the sort of case in which the coronary arteries quite often get narrowed at their mouths by the syphilitic process in the aorta, and so we get myocardial scars or lesions of myocarditis. It is perfectly possible that he has them, impossible to say so. We can therefore say it is a probable finding, but we cannot say more.

This is the lesion that produces aneurysm. Has he any evidence of aneurysm? I cannot see that he has. We have no X-ray. I do not know any reason to suppose that he has aneurysm, but we should like to have X-ray to exclude aneurysm, because it is so common in this disease. It would be strange if in two admissions for two months each they had not found it out. So I am going to say he did not have aneurysm.

The brain was not examined, so we will not speculate about it, as we never shall know.

A PHYSICIAN: This man would be entitled to have angina pectoris, wouldn't he?

DR CABOT: Yes. It is just the sort of case in which it occurs. But they did not favor us by saying anything about it, so I don't think we can say so.

A PHYSICIAN: Is the high red count due to increased red cell production?

DR. CABOT: No; I think it is stasis at the periphery. If we take a drop of blood from someone who is cyanosed we get an acute increase of red cells. If that goes on we get a permanent increase due to marrow growth. Dr. Mallory, did Dr. Richardson look at the marrow?

DR. TRACY B. MALLORY: No.

DR. CABOT: So we do not know whether he had a compensatory hypertrophy of the marrow. I do not believe he had.

A PHYSICIAN: Was the spinal cord examined?

DR. CABOT: I think not. I think it would have been negative, but we have no record.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Syphilitic heart disease.
Myocardial insufficiency (congestive failure).
Bronchopnuemonia.

DR. RICHARD C. CABOT'S DIAGNOSIS

Syphilitic aortitis.
Hypertrophy and dilatation of the heart.
General passive congestion.

ANATOMICAL DIAGNOSIS

1. *Primary fatal lesion*

Luetic aortitis.

2. *Secondary or terminal lesions*

Arteriosclerosis.
Hypertrophy and dilatation of the heart.
Chronic passive congestion, general.

3. *Historical landmarks*

Chronic pleuritis.
Cholelithiasis.
Chronic perisplenitis.

DR. MALLORY: The necropsy in this case was done between two and three months after death, so that Dr. Richardson was not able to determine some things, but it is nevertheless surprising how well the gross features are often preserved during a long period of refrigeration.

The head was not examined.

The peritoneal cavity showed about 500 cubic centimeters of thin brownish fluid. The peritoneal surfaces were negative.

The liver was at the costal border. The diaphragm on the right was at the level of the fifth rib, on the left at the sixth interspace.

In each pleural cavity there was considerable brownish fluid. The trachea and bronchi contained considerable frothy fluid. The lungs were negative except for chronic passive congestion.

The pericardium was negative. The heart weighed 570 grams and was much enlarged. The myocardium was apparently of good consistence and color. The right ventricle wall measured 3.5 millimeters, the left 15 millimeters. All the cavities of the heart showed considerable dilatation. The columnae carneae were somewhat flattened in the left ventricle. There were no thrombi. The valve circumferences were mitral 11 centimeters, aortic 8 centimeters, tricuspid 13.5 centimeters, pulmonary 9 centimeters. The mitral curtain showed short, slender fibrocalcareous columnar masses extending along beneath the surface which, other than for the slight irregularities produced by these impinging masses, was negative. These changes were considered to be arteriosclerotic in type. There was but little deformity of the valve. The aortic cusps showed fibrocalcareous plaques in the region of their bases, and in the region of their contiguous margins they were bound down by fibrous bands extending down from the aorta. There was some fibrosis of the cusps elsewhere, and the process bound the cusps down and decreased their widths to some extent. The other valves were negative. The coronaries were free and capacious. The orifices of the coronaries were slightly decreased by a process in the aorta to be described. The aorta was capacious. The ascending thoracic circumference measured 10-12 centimeters, the descending thoracic 8 centimeters, the abdominal portion 7 centimeters. The aorta showed very extensive fibrous and fibrocalcareous changes along its entire course, but most pronounced in the ascending thoracic region. In this region the wall generally was rather thin, and changes were so marked as to be pipe-stem in character, and this portion of the tube stood out like a large calcified trachea. On cross section there were places which resembled more or less the changes consequent to syphilitic aortitis. The great branches were capacious, but showed only a slight amount of fibrous sclerosis. The pulmonary artery, veins, venae cavae and the portal vein and radicles were negative. Microscopic examination confirmed the diagnosis of luetic aortitis.

The gall-bladder contained about fifteen small greenish stones, but the mucosa was negative.

The liver, spleen and kidneys showed chronic passive congestion, but otherwise were negative.

The adrenals, bladder and genital organs were negative.

DR. CABOT: We omitted to say anything about the chronic perisplenitis. We also failed to get the gall-stones, of which there were no symptoms, and we did not get the chronic pleuritis. Otherwise the diagnosis was correct.

I am interested in the chronic perisplenitis, because for years I have been noticing how often syphilitic cases show chronic perisplenitis. But I have never been able to get pathologists

to say that it means anything, that it is, like chronic orchitis, a relic of syphilis. But I cannot help thinking that the percentage of perisplenitis with syphilis is more than a coincidence

Did the pulmonary infection show up at necropsy?

DR. MALLORY: Not at all.

DR. CABOT: Of course gall-stones we are constantly finding in cases that have no symptoms. It is the greatest mistake to consider gall-stones a disease, unless they stir up trouble. Most people have gall-stones, just as they have wrinkles or gray hair, and it does not hurt them.

CASE 12432

A CASE OF GIANT CELL TUMOR TREATED BY RADIATION

ROENTGENOLOGICAL DEPARTMENT

An unmarried Irish clerk twenty-five years old entered the hospital May 21. For the past year she had had pain just below the right knee for which she had been under treatment by a local physician without relief. The day before admission she fell and had severe pain in the right knee. After this she was unable to walk.

Examination showed a fairly well developed and nourished woman entirely normal except for a blowing systolic murmur at the third and fourth left interspaces, exquisite tenderness on the upper end of the right tibia on pressure or motion and some increase in the size of the tibia just below the knee. No swelling or edema was made out.

There is no record of the urine except that the amount was normal. Blood examination showed 11,400 leucocytes, 64 per cent. polymorphonuclears, 6 per cent. eosinophils, hemoglobin 80 per cent., 4,540,000 reds. Wassermann negative.

X-ray examination showed a pathological fracture through the head of the right tibia. The upper end of this bone showed a pathological process which was characteristic of some destruction. There was no evidence of proliferation. There was a coarse trabeculated appearance in this portion of the bone and some thickening of the cortex. The process extended to the joint line but apparently did not invade the joint. The pathological fracture extended through this area, with a break in the contour of the inner side of the bone. The findings suggested a benign giant cell tumor with pathological fracture. No kidney outlines were visible on either side. There were no shadows suggesting stone. Plates of the other long bones and the skull failed to show any definite evidence of disease. Those of the pelvis were negative except for slight irregularity in outline just above the acetabulum on both sides. The spine and chest showed no evidence of disease of the bone. There was an area of increased density in the left lower chest and some narrowing of the intercostal spaces on this side. The diaphragm was high and slightly irregular in outline. The plan for treatment adopted was short wave X-ray therapy, using two fields, one front and one back, each 15 by 15 centimeters. Two-thirds of an erythema dose was to be given to each field in one sitting.

A moulded plaster posterior splint was applied from the groin to the toes. The patient was comfortable. June 13 the first X-ray treatment was given. She showed no Roentgen sickness after it. June 20 the surgeons decided that as X-ray treatment might absorb the bone the patient must be in traction for a while. She was comfortable in the traction and afebrile. July 7 X-ray showed the pathological fracture through the tumor at the upper end of the tibia. There was also definite callus formation visible in the anteroposterior view. July 18 the traction apparatus was removed and a cast applied to the groin. July 19 X-ray was taken in the anteroposterior view. The position appeared excellent. In the lateral view there was a little posterior bowing of the tibia. July 19 she was discharged.

August 4 she returned to the X-ray Department with the cast on. The cast was removed. A plate of the knee showed very little change. There was no skin reaction. She was given short wave therapy, two-thirds of an erythema dose to two areas as before. August 10 she reported that she had had no definite reaction following the treatment. Another X-ray treatment was given, completing the series. She was told to return in three months for observation.

September 22 she reported in good health, with no complaints and no pains. There had been no reaction following the treatment, and she was somewhat discouraged. Comparison of X-rays taken on this day with previous films showed very definite improvement. There had been considerable deposition of new bone since the last examination. She was sent to the Out-Patient Department to obtain some sort of supporting splint. A light plaster cast was applied.

October 20 she returned. The cast was split, X-ray of the upper tibia taken, and the cast was reapplied by means of a bandage. November 10 she returned, still wearing the split cast. There had been some improvement of the condition as shown by X-ray. The first of another short wave series of X-ray treatments was given to the posterior surface of the leg, and November 17 one to the anterior surface. There was very little pain in the region of the injury, and she got about fairly well. She was advised to continue wearing the removable cast and to report in two months.

January 5 she came to the Emergency Ward

because of a fall. Examination of the plates taken failed to show any definite evidence of fracture. The density of the bone in the involved area had definitely increased, but apparently was not filled in. No further treatment was advised. She was told to report at the Tumor Clinic for observation, but did not report.

March 16 she came still wearing the brace on the leg. Since the removal of the cast she had complained of a little pain and tenderness over the internal condyle of the right femur. A plate of the knee showed definite improvement as compared with previous films, evinced by a filling of cavity with new bone. No further X-ray treatment was advised. A Thomas walking splint was fitted.

May 25 the patient was seen at a clinic at another hospital. The surgeon in charge reported that she was doing very well. X-ray examination at the hospital mentioned showed apparent slight increase in bone production. An appointment was given the patient to report here in two months.

August 24 she reported, very much improved. The bone was now nearly normal in density, as shown by X-ray. (See Plate II.) She was able to walk and use her leg with practically no dis-

PLATE I. Taken July 14, 1925. The upper end of the right tibia shows a pathological process characteristic of some destruction. There is no evidence of proliferation. There is a coarse trabeculated appearance in this portion of the bone, and some thickening of the cortex. The process extends to the joint line, but apparently does not invade the joint. A pathological fracture extends through this area, with a break in the contour of the inner side of the bone. The findings suggest a benign giant cell tumor with pathological fracture.

comfort. The skin over the area treated showed no variation from the normal. September 8 she was advised to keep on the splint when walking outside and for long trips, but was told she might remove it while indoors.

Discussion

BY GEORGE W. HOLMES, M.D.

The thing that we are interested in is the knee. I won't attempt to discuss the blowing systolic murmur.

Dr. Cabot: I cannot tell whether it means anything. In the majority of cases it would be negative. This sounds a little like an acute periostitis or osteomyelitis which might cause an acute endocarditis. But my guess is that it means nothing.

Dr. Holmes: An interesting point in the history is that she had trouble with her knee

PLATE II. Taken August 24, 1926. Comparison with previous films shows very definite improvement. There has been considerable deposition of bone since the last examination.

for some time before she got the injury, and that a comparatively slight injury brought on very acute symptoms.

I presume this is a normal blood.

Dr. Cabot: I am not used to the term "pathological fracture". I thought all fractures were pathological.

Dr. Holmes: I suppose it is not a very good term. What we mean is that there is a pathological condition besides the fracture.

Dr. Cabot: Can you see that? Does it look differently when it is due to injury?

Dr. Holmes: The fracture is due to injury and would look like any injury. But besides that there is some abnormal condition in the bone.

Dr. Cabot: It is a pathological condition and also a fracture.

Dr. Holmes: Yes.

Dr. Edward L. Young, Jr.: I think the term is pretty generally used and understood throughout the country.

Dr. Cabot: There are a great many poor terms used throughout the country.

Dr. Holmes: That the process did not invade the joint is an important statement. In addition to the knee we examined other parts of the body looking for evidence of disease, particularly to rule out a metastatic form of malignant tumor.

The first plate is not taken in the usual position in which we take chest plates. This patient was not able to stand, and we were not able to take it at seven feet distance, so that this heart shadow is considerably magnified. It is also different in shape from the usual plate. The area of increased density is seen from the left border of the heart to the axillary margin. The increase is very slight and might be due to any condition which prevented complete aeration of the lower lobe of that side. If she were holding herself rigid it might do that. It is also possible that the breast overlaps more on this side than on the other. And it is also possible that she has some change in the pleura on that side which would cause limited expansion. Pleural thickening of itself does not show, but it does prevent expansion of the lung under it, and in that way does show. We are not able to say anything about the heart in this plate.

The plate taken in July is one of the early plates. This is the area in which the lesion is located and shows some things which are rather characteristic of giant cell tumor. First, it is in the diaphysis or end of the long bone and involves the epiphysis. Most of the other types of bone tumors are found in the shaft and rarely extend into the epiphyses. Then there is a definite bulging of the whole bone. Its diameter is increased both in the anteroposterior and in the lateral view, so that it must be a tumor which arises in the medulla and which has pushed the cortex outward. The malignant bone tumors very rarely do this. They destroy the cortex and invade the soft tissue instead of bulging the bone.

Malignant tumor of the medullary type which resembles giant cell tumor does not produce bulging. The other forms of malignant tumors, and by far the most common, start from the periphery of the bone and show radiating lines of new bone extending out into the soft tissue. The metastatic tumors may start in the medullary portion and may destroy the bone, but they rarely bulge the bone. Practically the only metastatic tumor which does bulge the bone is hypernephroma, but that more often goes through into the soft tissues.

All the examinations of other bones were negative. That would almost rule out a metastatic lesion. So that we have it down to a

primary lesion at least, and a medullary type of primary lesion.

Of course it might not be a tumor. It might be any destructive process in the bone, like osteomyelitis or tuberculosis of the bone, or a simple cyst. Osteomyelitis as a rule is not so circumscribed. It produces new bone. This is almost wholly a destructive lesion. Osteomyelitis would have involved the periosteum, and it would have extended down the shaft more. The clinical history also would practically rule that out. Tuberculosis in this region would certainly involve the joint. We never see a case of tuberculosis with such an amount of bone destruction so close to the joint that does not invade the joint. Osteomyelitis would also invade the joint. All the medullary tumors do this thing. They come up to but they very rarely invade the joint. In this case there is no soft tissue tumor present, which is against its being malignant tumor.

I hope Dr. Mallory will say something about cyst in his discussion. There is a considerable difference of opinion as to just what constitutes a cyst. Some say they are burned out giant cell tumors. I have some evidence in another case pointing that way. They may be some stage of a giant cell tumor. By X-ray we expect to find a cyst in a patient under twenty, before the epiphyses have united. We very seldom see a true cyst, what we call a true cyst, after that age. The cysts are usually in the shaft of the bone. They do not tend to bulge the bone, but extend along the shaft, and they are not trabeculated. The X-ray appearances of giant cell tumors are: (1) A single lesion located in the epiphysis and diaphysis of the bone. (2) It bulges the bone and does not break through the cortex. (3) There is no accompanying soft-tissue tumor. (4) It is trabeculated and often extends into tuberosities and processes of bone, as this one does. With any other tumor I doubt if we ever get it extended out into processes and tuberosities.

The plan of treatment: At the Memorial Hospital in New York satisfactory results have been reported in the treatment of this type of tumor with radiation in various forms. We have treated probably a dozen cases in this clinic. Radiation was considered in this case, also some form of surgery. These tumors do not get well by simply fracturing them, as a cyst would.

The patient was seen in consultation with a surgeon. His opinion was that amputation of the leg would be the best thing to do if he did anything. The shell of bone was so thin that he would be obliged to go into the joint. The best he could expect would be a stiff knee and a very much shortened leg. The question was whether she would not get a better result by amputation and an artificial limb. For that reason we thought we would try radiation in the hope of cure. The disadvantage of radiation is that it takes a long time, that patients have to be incapacitated for a year, and then there is the possibility that the treatment will be unsuccessful. If the patient is a wage-earner time would have to be considered.

It was decided to give this patient X-ray treatment and at the same time to use some sort of supporting apparatus. It is essential to keep the leg supported by some sort of orthopedic apparatus, otherwise we get a mushrooming of the whole area and the result would be a stiff knee.

She had radiation, high voltage, applied in three different series at intervals of about a month, and then no treatment up to the present time. At no time was the dose large enough to produce any injury to the skin. I think that is a very important point in the treatment of benign lesions. We do not know what will happen to the skin that has been treated if the patient lives long enough. If we treat a person with a benign lesion and produce tumors of the skin, fifteen years afterwards he may have a serious lesion. Therefore I think it is important to keep well below a dose that would cause any change in the skin whatever, and it is perfectly possible to do so if we use a short wave type of radiation.

At first she got worse, and that is what we expect. The first reaction of this tumor is to get decidedly worse. The trabeculations disappear, the shell becomes thinner, and if the leg is not properly supported that is the time when we get a mushrooming and resulting deformity. Then too there is a slight bulging of the bone. We do not know what takes place. Then it begins to get well: new bone forms slowly in the lesion. In the fourth plate it is quite obvious that there has been a good deal of new bone. There has been a corresponding clinical improvement in the patient. She is walking without any support, feels perfectly well, and has almost complete motion of her leg. We think that she will probably continue to improve and to form new bone, and we can almost count this a cure.

There is one thing to be considered, and that is that she had a fracture. Some of these tumors get well with a fracture alone, and we do not know how much influence the fracture had on the result.

DR. YOUNG: Have you treated others of the same type with radiation?

DR. HOLMES: Yes. We have got practically the same results. We do not always get as good functional results. Most of the cases we have treated have been in the spine and pelvis, where surgery was impossible.

DR. YOUNG: If it were a case where surgery could be done safely, would you advise that in place of radiation?

DR. HOLMES: Yes, I would, because the results are much quicker.

DR. YOUNG: Would you use radiation in addition?

DR. HOLMES: I think I should not, because they usually get well with surgery alone.

DR. CABOT: I was interested in your last remarks about the therapeutic results of the fracture. It seems to make it less accurate than ever to call it "pathological".

DR. YOUNG: I thought that if there was active tumor formation the fracture did not generally cure.

DR. HOLMES: It is not a common thing. Some of them get decidedly worse after a fracture. I really think that the radiation is the cause of getting better. But one might easily bring up that argument.

DR. MALLORY: I do not think I can add much to what Dr. Holmes has said about giant cell tumors, except to describe the histology. They commonly occur near the heads of bones and close to the epiphyses. Also a histologically identical tumor is very common on the jaw, ordinarily called epulis. It is a much debated point as to whether these two tumors are neoplasms. Some pathologists think they are; many others think they are not. I think especially in Boston the opinion is against their being neoplasms. Very similar processes are found along tendon sheaths, along bursae, and the entire picture can be explained on the basis of chronic inflammation. Histologically we find very numerous foreign-body cells and many endothelial leucocytes. Very often we can actually trace the formation of the giant cells by the fusion of these leucocytes. In contrast to that, in the malignant osteogenic sarcomas, where we also have giant cells, they are an entirely different type. Instead of being formed by the fusion of a number of separate cells, they are formed within themselves by multiple mitoses, and we can often find a cell which is dividing into six or eight; sometimes as high as fifteen to twenty mitoses within a single cell are seen. Histologically typical specimens of the two types of giant cells are usually distinct and characteristic, but individual cells in any tumor may be difficult to classify.

On the other hand, that does not always help in making a diagnosis of a tumor microscopically, because any process in bone which leads to bone destruction will stimulate the appearance of foreign body giant cells. So that even the osteogenic sarcomas will also have this type of giant cell with or without the other.

But these benign giant cell tumors never have the true tumor cell with multiple mitoses.

As Dr. Holmes said, cases have been known which have healed after fracture, and other cases have healed following a simple incision. Curettage is very effective, and radiation appears to be. It rather suggests that the process of rarefaction of the bone is due to pressure from within the shaft. These tumors always develop in the interior of the bone, not on the surface, and we know that bone is very easily eroded by pressure, and quite frequently the relief of pressure will result in the clearing up of the process. As the lesion begins to heal, the tissue becomes less characteristically granulomatous and the foreign body cells gradually disappear. We get formation of dense bands of fibrous tissue and often the appearance of cysts surrounded by connective tissue, and the final healing may be complete or may be a cyst at the site of the original tumor.

DR. CABOT: What do you think is the best name for these things?

DR. MALLORY: I should certainly not call them sarcomas, because sarcoma means malignant tumor, and there is nothing in these tumors that suggests any other type of sarcoma that we know. I think it is quite fair to call them benign giant cell tumors, because that is not necessarily a neoplasm.

DIAGNOSIS

Giant cell tumor of the upper end of the tibia, with fracture.

CASE 12433

HEMATURIA HERE AS ALWAYS IMPORTANT

SURGICAL DEPARTMENT

An Irish-American salesman thirty-seven years old entered August 30 through the Emergency Ward. The chief complaints were hematuria and frequency. Eight months before admission while he was playing billiards he had a severe "stitch" in his back. He bent over with pain and could not straighten up for twenty minutes. At the same time he noticed that the last few drops of urine at micturition were bloody. He had several of these sudden cramp-like attacks of pain, especially during the month of August. Two and a half months before admission he began to notice clots of blood in the urine, and at the same time had a desire to urinate frequently and had burning micturition. A month before admission his micturition was every two hours at night and every hour or two during the day.

Records of the Out-Patient Department August 12 show that he came to the Emergency Ward the previous night because he could not pass urine. An attempt at cystoscopy that night was unsuccessful because of bleeding. The following day cystoscopy was done. He was referred to the wards.

He gave a past history of gonorrhea fourteen years before admission, and an attack of influenza lasting three days.

His family history showed that his father died of "stroke" and his mother of "dropsy".

Examination showed a well nourished man. There were many decayed teeth, and pyorrhea. The second heart sound was so faint at the apex that the question of murmur could not be decided. The heart and pulses showed no other abnormalities. The condition of the arteries is not recorded. The blood pressure was 125/70. The lungs were normal. The abdomen was very tender on deep palpation of the urinary bladder. There was a possible mass.

The urine before operation was normal in amount, specific gravity 1.018, alkaline, a trace of albumin, six to eight red blood corpuscles per high power field. The blood is not recorded. The non-protein nitrogen was 39 milligrams per 100 cubic centimeters of plasma. A renal function test gave the appearance time at seventeen minutes; in two hours 35 per cent. A Wassermann test was negative.

September 1 cystoscopy was done, and September 3 operation. Two days later the patient was in fair condition. The pain was controlled with morphia. The distinct possibility of inflammatory edema about the ureters as a sequel was now only a secondary consideration. The bladder was fairly clean with boric irrigations. There was very little blood. Although the wound did surprisingly well the patient steadily lost ground, did not eat, and September 14 died.

Discussion

BY EDWARD L. YOUNG, JR., M.D.

Two facts here, taken together, are somewhat contradictory as we consider them. In the first place terminal hematuria practically always means the shutting down of the bladder wall on the source of trouble in the bladder, as an ulcer or papilloma, so that the urine, at first clear, is at the finish bloody. I have once only known of a terminal hematuria which was unquestioned, where the source was in the kidney, but once is enough to prove that it can come from there. The second fact is the stitch in the back, which was very severe. That suggests kidney, either stone as a possible cause of that bleeding, or a clot trying to escape. It might mean obstruction of the ureter from something in the bladder.

This was eight months ago, and I think that if any of us had a hematuria we should look for help in a hurry, with what we know of the possibilites of danger. That is, even at thirty-seven it is serious in considerably more than fifty per cent. of the cases. So far as we have any story, he did not report until he came in here.

Of course bladder symptoms do not help us at all in localizing urinary difficulty, because a kidney condition alone will cause reflex bladder symptoms.

The renal function is lower than we should expect to find in a perfectly healthy adult male. but not low enough to mean anything at all suggestive.

What are the possibilites? A man of thirty-seven with attacks of cramp-like pain in the back and hematuria, which are the only things definitely given us. The hematuria is apparently intermittent, at times very severe, because he passes clots. We are told that it is terminal once. The attacks of pain do however suggest a possible source of trouble there. But the important thing, as with all cases of hematuria, is that it is serious. The chance of its being papilloma of the bladder, or more important still, carcinoma of the bladder or stone, tuberculosis or neoplasm of the kidney, is so great that hematuria should always be investigated. As we say so often here, bleeding from any orifice of the body, if the cause is not absolutely known, should be investigated.

The findings of the cystoscopy of course are not told us because they would give the story away. On the theory of chances I should put bladder tumor first and any of the other things I have mentioned second. The cystocopy done August 12 should have meant tumor, because the bleeding was so profuse that they could not see anything, and that can generally result only where the source of bleeding is in the bladder.

CYSTOSCOPY AUGUST 12

Showed a large sloughing neoplasm on the left side of the bladder neck from twelve o'clock to six o'clock. The extent was not made out, but the right wall, the fundus and the base were apparently normal.

Further Discussion

This report suggests malignancy.

The question of treatment: The only thing for a mass as extensive as that is operation, and depending on the condition actually found it will depend on whether or not an attempt at excision, an attempt at diathermy, or the implantation of a heavy dose of radium would be the course followed. Of course the cystoscopy does not always give the exact location or extent, but it gives near enough to say that there is nothing to do except through a bladder opening.

DR. YOUNG'S PRE-OPERATIVE DIAGNOSIS

Tumor of the bladder, perhaps malignant.

PRE-OPERATIVE DIAGNOSIS

Tumor of the bladder.

CYSTOSCOPY SEPTEMBER 1

By means of a constant flow of water calcified encrusted tumors both of the roof and the base of the bladder were seen. These were evidently papillomata. Open operation and diathermy indicated.

DR. YOUNG'S PRE-OPERATIVE DIAGNOSIS

Carcinoma of the bladder.

PRE-OPERATIVE DIAGNOSIS

Carcinoma of the bladder.

OPERATION

Gas-ether. Through a suprapubic cystostomy incision a large malignant growth of the bladder was easily palpated extending from the region of the trigone on the left side of the bladder wall, crossing the fundus of the bladder and extending midway down the right wall. As much as possible of the growth was removed from the wall of the bladder; then electrocoagulation was used and the bladder closed in the usual manner.

of cure is almost *nil*, and the chance of helping him was taken in the form described. The justification for it is the extreme suffering that most of these patients have if they die of the growth in the pelvis.

I think the questions of importance to us for Dr. Mallory to settle are: (1) The question of the blocking of the ureters either by the nearness of the growth previous to the operation, or from the edema following the operation. (2) The question whether or not the diathermy had done more damage than was recognized and there was sepsis, either retroperitoneal or in the peritoneum. These are the two things to consider as causes of death.

PLATE I. Epidermoid carcinoma of the bladder.
DR. TRACY B. MALLORY.
Photograph by Louis M. Adams.

PATHOLOGICAL REPORT

A mass of necrotic tissue. Microscopic examination shows squamous cell carcinoma.

FURTHER DISCUSSION

I think one of the most discouraging forms of malignant disease is carcinoma of the bladder. A very large percentage of cases of carcinoma of the bladder die of carcinoma with the operation doing very little good. Life is sometimes prolonged, and a few cases have been cured.

This is a very massive growth. The chance

A PHYSICIAN: Was an X-ray taken in this case?

DR. YOUNG: No. They apparently got all the information they needed with the cystoscopy.

Hematuria coming on out of a clear sky in a man of this age is either papilloma or carcinoma in a very high percentage of cases, and here it is carcinoma. Of course the cystoscopy showed a tumor and the operation showed it to be malignant.

A PHYSICIAN: What was the cause of the pain in his back?

DR. YOUNG: That is the reason I asked about the condition of the ureters, as influenced by the growth before operation, because from the description it may have shut off that kidney some time before.

CLINICAL DIAGNOSIS (FROM HOSPITAL RECORD)

Carcinoma of the bladder.
Carcinomatosis.
Cachexia.
Hypostatic pneumonia.
Operation, fulguration of carcinoma of the bladder.

touched the surface of that. The great mass of the tumor was left entirely unchanged.

The man was very well developed and nourished. There was no emaciation, and yet he had about the most extensive metastases in the lungs that I have ever seen in any case.

I have a picture of the tumor in the bladder. (Plate I.) There is not only the main portion of the tumor, which has been cut in half—this is a longitudinal section through it,—but there are also numerous implantation metastases on the opposite side of the bladder wall. The other (Plate II) is a picture of the lungs, giving some idea of the metastases.

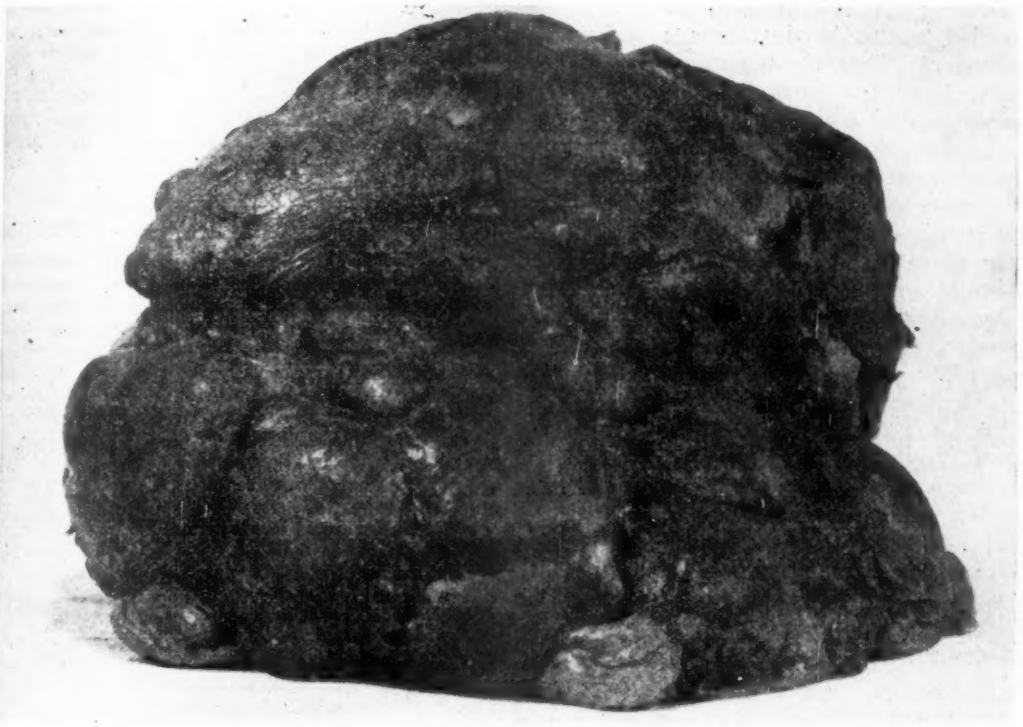

PLATE II. Metastatic carcinoma of the lungs.
DR. TRACY B. MALLORY.
Photograph by Louis M. Adams.

DR. EDWARD L. YOUNG'S DIAGNOSIS

Carcinoma of the bladder.

ANATOMIC DIAGNOSES

Epidermoid carcinoma of the bladder.
Metastases to lungs, liver, spleen, kidneys, pancreas, intestines and various lymph nodes.
Healed cholecystitis.

DR. MALLORY: A very striking thing about this case pathologically was the enormous size of the original tumor and the tremendous extent of the metastases, which were apparently entirely unexpected. The tumor of the bladder was a mass measuring fifteen by twelve by eight centimeters, and of course the cautery had just

The specimen will show it even better. Practically everywhere there was a rim of tumor nodules from two to five centimeters thick extending the entire way around the periphery of both lungs. The only spot in which any normal parenchyma was to be seen was in an area about five to ten centimeters square. In addition to that he had metastases in all the other viscera, including the intestinal tract. The Peyer's plaques were enlarged and ulcerated and looked almost like the ulcerations of typhoid fever except that it was the ones at the jejunal end chiefly that were enlarged, rather than the ones down toward the ileocecal valve.

Microscopical sections of the case showed metastases everywhere, large and small. I almost think that if one could have centrifuged specimens of his blood it would have shown can-

cer cells in the terminal stages. There was hardly a point throughout the body where we did not find metastases, and yet there was no general loss of weight, probably because of the rapid course of the disease.

DR. YOUNG: Clinically we have always considered it true with carcinoma of the bladder that metastases were relatively late. Could this be true from the pathological point of view?

DR. MALLORY: I believe it is considered so. This was evidently a very rapidly growing tumor from the start. The symptoms are all of relatively short duration and the primary tumor unusually large.

DR. YOUNG: Had it invaded the bladder as the so-called leather-bottle stomach is invaded by carcinoma? There is one other case that I have seen that I cystoscoped two or three months before death, that had apparently nothing in the bladder, yet at necropsy it was infiltrated with carcinoma and there were metastases all through the body, to a less extent than this but scattered everywhere. I wondered if there was a growth analogous to that called the leather-bottle stomach.

DR. MALLORY: In this case it was more a papillomatous type of growth with a little infiltration of the wall but no extension through it, no local extensions in the pelvis.

DR. YOUNG: As you saw that tumor in the bladder thirteen days after fulguration, if you had not known what had happened would you have known it was cauterized?

DR. MALLORY: I think I should have suspected it because the surface was so grayish and there was still coagulation on the surface. But it had just touched the surface.

DR. CABOT: Would this operation have been prevented had they found these metastases?

DR. YOUNG: I think so.

A PHYSICIAN: Could you tell how long it took to develop, or did you find any other metastases in any other part of the body?

DR. YOUNG: I do not think we can tell how long. Dr. Mallory says it was a rapidly growing tumor, but I don't think that tells us in days or weeks.

DR. MALLORY: No. I should be quite certain from the appearance that those metastases are of weeks' duration. That is certainly not a post-operative growth. It must date well back before the operation.

WHEN THE MIDDLE CLASSES ARE ILL

At the annual convention of the American Hospital Association at Atlantic City came up the topic—the severe economic strain which sickness imposes on the American family of limited means. Tradition and pride deter it from resorting to free hospital treatment. The problem has been aggravated in recent years by the rise of the small apartment. It is not only expensive for the white-collar worker to be ill in his own home, but it entails discomfort on both patient and family when the number of rooms in an apartment has been reduced to a minimum.

There is implied here a criticism of the economics of private hospital management. Because of the aforesaid pride and tradition, the middle class will continue to insist on paying its way with the doctors. But there seems no valid reason why paid hospital service should come higher than the paid services of the family physician in former days. In every sphere where centralization has established itself, notably of course in industry, the process has been accompanied by lower costs in the product. A private hospital need not be run as a charitable institution in order to supply adequate service at a cost comparable with the private physician's fees.

A second criticism is implicit in the suggestion that "physicians coöperate by eliminating all unnecessary laboratory tests which are expensive." Where once the family physician made his diagnosis with stethoscope and elementary internal tests, there is now an elaborate process of examination by X-ray, accompanied by possibly half a dozen tests for various bodily functions. This makes, no doubt, for more precise knowledge and more intelligent treatment, but Atlantic City hints that perhaps in a good many cases the thing is being overdone.—*The New York Times.*

RESEARCH ON SURGICAL SUPPLIES

According to Dr. E. R. Weidlein, Director, Mellon Institute of Industrial Research, University of Pittsburgh, a manufacturer of surgical supplies has established at the Institute a fellowship that will study the exact requirements of surgeons and other medical specialists in the way of sundries, with the joint aim of developing new supplies that are needed and of standardizing the products now in use. An investigation will also be made of the processes of renovating used supplies, and several other industrial fellowships of the Institute will coöperate in devising satisfactory procedures.

Dr. Frederic H. Slayton (M.D., Rush Medical College) will be in direct charge of this comprehensive research. The fellowship will be operated in a totally unbiased and independent manner, in accordance with the Mellon Institute system, and all its investigations will be conducted primarily for the benefit of the public. It is the plan to report the results in appropriate periodicals as the various phases of the studies are concluded.

In carrying on this work, Dr. Slayton and the Institute's executive staff invite the concurrence of all interested organizations. They are especially desirous of securing the close collaboration of hospital executives and of members of the medical profession.

MILBANK FUND AIDS NEW HEALTH MOVE

A model $250,000 health center will be opened at 325 East Thirty-eighth Street, in November, by the Milbank Memorial Fund, established twenty years ago by the late Elizabeth Milbank Anderson. The fund is spending $2,000,000 for the promotion of public health work, according to an announcement recently by John A. Kingsbury, secretary.

In the building, a five-story brick structure, will be tuberculosis, social hygiene, dental and infant welfare clinics, which will be maintained by the New York City Department of Health. The headquarters of the Community Health Council also will be there. Similar health projects are being promoted by the Milbank Memorial Fund in the city of Syracuse and in rural Cattaraugus County.

Appropriations during 1925 brought the total of the Milbank Fund's philanthropic grants since its establishment to $3,954,529.49. Of a total of $525,854.19 pledged during the year, $325,000 was granted for use in continuing the New York health demonstrations.—*New York Times.*

THE BOSTON
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Established in 1828

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THE DEVELOPMENT OF MENTAL HYGIENE

The science of mental hygiene is one of the relatively recent fruits of the growth of medicine. Treadway, in *Public Health Bulletin No. 148*, on "Mental Hygiene with Special Reference to the Migration of People," defines its purpose as, first, the adoption of measures seeking to prevent the development of such behavior on the part of individuals as would eventually bring them into social conflicts of one kind or another, and, second, the reclamation of those who because of mental disease or mental defect have become maladjusted to their social environment.

Mental hygiene has grown into an independen branch of psychology only within the past fifteen or twenty years. Treadway, in the above monograph, traces its development and describes its purpose in the social evolution of man. Previous to the year 1388, relief of the poor, the helpless and the insane was a matter of hit or miss charity on the part of the upper classes. In that year the English government passed a regulation distinguishing between able-bodied vagabonds and the helpless poor, and assigning a portion of the church revenues for the relief of the latter. A few monasteries and almshouses gave relief to the needy, but it was not until the middle of the sixteenth century that any sort of specialized care for the insane was forthcoming. At that time the Bethlehem Hospital was utilized for this purpose; the condition prevailing there gave rise to the word "bedlam" as a term synonymous with pandemonium.

In early Colonial days, the insane were confined in almshouses together with the destitute, vagabonds and those afflicted with communicable diseases. Probably the first public almshouse in America was built in 1660 in Boston.

For a long time the almshouse, or workhouse, as it was often called, was the sole place of refuge for the insane. In 1409, a hospital for the mentally disordered had been built at Valencia, in Spain. By 1792 only fifteen such institutions existed in the world. In America, the provincial assembly of Pennsylvania in 1751 passed an act of incorporation for an institution which would provide not only for the relief of persons suffering from general diseases but also for those "distempered in mind and deprived of their rational faculties." Virginia was the first colony to establish a hospital exclusively devoted to the treatment and care of the mentally diseased; it was opened in September, 1775. In 1797 the New York Hospital began to receive insane patients. During the second decade of the nineteenth century several other insane hospitals were opened, among them the McLean Asylum for the Insane, a branch of the Massachusetts General Hospital (1818). From that time on every decade saw numerous new asylums opened for the reception of the insane. In 1791, at the Hospital Bicetre, Dr. Pinel had demonstrated the feasibility of treating insane patients without subjecting them to the restraint of shackles; in 1844 the first issue of the *American Journal of Insanity* appeared; in 1845 was held the first meeting of a society known later as the American Psychiatric Association. All of these factors were concerned in in bringing about in this country a much enlightened view of the care of the insane,—a very different one from that prevailing previous to 1775, when the insane department of the Hospital of St. Mary of Bethlehem in London was used as a public show, admission being charged to see the actions of the inmates.

Coincident with the establishment of insane asylums in this country, there came a recognition of the bad effects of committing youthful offenders to jail and workhouses in which confirmed criminals and vagabonds were confined. In 1825, New York City provided a separate institution for the reformation of juvenile offenders, and Philadelphia and Boston followed suit. In Massachusetts a state visiting agency was established in 1869; the policy of putting youthful offenders on probation was an important

item in the treatment of such cases. In 1911 the Massachusetts Legislature recognized the "defective delinquent" group and provided for the removal of such individuals from certain public institutions. Juvenile courts were established in various states, and Massachusetts provided that all persons accused of murder in first or second degree should be examined by representatives of the department of mental diseases. Gradually the public—or its more enlightened portion—has come to regard crime as the result of social unfitness, to be dealt with by educational rather than by retributive measures.

The American Association for the Study of the Feeble-minded has classified the feeble-minded as (1) idiots, (2) imbeciles, (3) morons, according to the degree of mental development. The problem of the mental hygienist is to arrange for the early detection of these cases, largely through the behavior of children in school, and in part through getting such cases when they are brought into court for misdemeanors. Each case is to be subjected to that process of education which will serve best to make the individual self supporting and not a source of danger to his community. Some will require segregation in institutions; others, after a period of training may be let out on parole; still others may need only special attention in classes for backward children, or the removal of physicial or environmental obstacles, to become happy and useful citizens. The fact that there are some 500,000 feeble-minded persons in the United States shows the magnitude of the problem, and its importance to our future welfare.

PUBLIC HEALTH LAW

Only nine of the forty-eight States have in their constitutions specific provisions pertaining to public health, according to James A. Tobey, lecturer on Public Health Law in the Massachusetts Institute of Technology, a summary of whose lecture has appeared in the Washington *"United States Daily."* These nine States are California, Delaware, Florida, Louisiana, Oklahoma, South Carolina, Texas, Washington and Wyoming. In all these States except Texas, specific provision is made for a board of health, in Texas the creation of such a board being permissive and not mandatory.

Specific mention of public health in a State constitution is not necessary, however, in order to give the State power over this important function of government, for the duty of caring for the health of its people is part of the police power of the State, a power possessed before the National Government was formed.

Of these nine constitutions the State board of health is the subject of provisions in those of California, Delaware, Florida, Louisiana, Oklahoma, Texas, and Washington; county or parish boards are dealt with in those of Florida and Louisiana, and local boards of health are dealt with in the constitutions of Delaware, Louisiana and South Carolina. The practice of medicine is the subject of provisions in the constitutions of Louisiana, Texas and Washington.

SELF PURIFICATION OF OYSTERS

The Journal has, within the year (March 18), published an editorial based on investigation by William H. Park and Charles W. Krumwiede concerning the efficacy of chlorination of contaminated oysters in freeing them from pollution. Results were unsatisfactory, indicating that the only way to keep oysters free from B. typhoses was to grow them in uncontaminated waters.

Dr. Krumwiede has continued his investigations and has recently summarized them in the *New York City Health Department Weekly Bulletin* (September 18, 1926). In these experiments oysters were kept under natural conditions in oyster beds. Oysters contaminated with typhoid bacilli feces were returned to their natural waters during May and early June and were found to have freed themselves from the bacilli in a maximum of sixteen days. The viability of B. typhoses in sea water from the same area was tested under laboratory conditions and could be recovered till the nineteenth day but not on the twenty-fourth.

Another experiment showed the seasonal difference in the rate of self purification of oysters, for contaminated oysters returned to their beds and tested during December and January—the hibernating period—contained the bacilli up to the fifty-first day, when the last batch of oysters was used. Therefore, although hibernation may lessen contamination from without because of the lessened amount of water "drunk" by the oyster, contamination during hibernation is especially dangerous because it lasts so much longer.

SMALLPOX IN RIO DE JANEIRO

A report recently received at the U. S. P. H. Service conveys the information that of 1908 cases of smallpox in Rio De Janeiro in the period from Jan. 1 to August 14, 945 died. This shows that the virulence of this disease is as active as ever in some epidemics. Massachusetts should be thankful for the measure of protection now afforded by our law and move forward in eliminating smallpox as a hazard to life.

If we do not succeed next winter in making vaccination compulsory for private school pupils, the medical profession must bear part of the blame. If full understanding of the problem is acquired by the people the legislature will be obliged to enact the bill which will be presented.

THIS WEEK'S ISSUE

CONTAINS articles by the following authors:

ROCK, JOHN, S.D.; M.D. Harvard Medical School 1918. Assistant in Obstetrics, Harvard Medical School; Assistant Visiting Physician to the Out-Patient Department, Boston Lying-in Hospital and Surgeon to Out-Patients Free Hospital for Women. His subject is "Miscarriage: Its Causes, Diagnosis and Treatment." Page 843. Address: 24 Marlborough St., Boston.

FITZ, G. W., M.D. Harvard Medical School 1891. Member of Boston Medical Library; New York Academy of Medicine; American Physiological Society; Formerly Assistant Professor of Physiology and Hygiene, Harvard University. His subject is "A Clinical Study of Muscular Cramp: A Physiological Cure." Page 854. Address: Peconic, Suffolk Co., N. Y.

WELLS, DAVID W., M.D. Boston University School of Medicine 1897. F.A.C.S. Professor (Emeritus) of Ophthalmology, Boston University School of Medicine; Ophthalmic Surgeon (Emeritus) Massachusetts Homeopathic Hospital; Oculist Newton Hospital. His subject is "Why We Use 'Drops' in Fitting Glasses." Page 857. Address: Hotel Westminster, Boston.

HUBER, EDWARD G. Detailed Record on Page 291, No. 6, Vol. 195. Continued article on "The Control of Communicable Diseases Prevalent in Massachusetts." Page 859. Address: War Dept., Washington, D. C.

DENORMANDIE, ROBERT L., A.B.; M.D. Harvard Medical School 1902. F.A.C.S.; Instructor in Obstetrics, Harvard Medical School; Assistant Visiting Obstetrician, Boston Lying-in Hospital; Obstetrician, Mass. Women's Hospital; Consultant to Waltham Hospital, Newton Hospital and N. E. Hospital for Women and Children. He presents the article "Progress in Obstetrics." Page 862. Address: 355 Marlborough St., Boston.

MISCELLANY

ETHER DAY

ETHER DAY was celebrated this year at the Massachusetts General Hospital on October 18 instead of October 16. During the morning surgical operations were scheduled in the amphitheatre after which the staff and visitors gathered in the renovated Ether Dome. With Dr. George W. W. Brewster as presiding officer, progress in the various departments of the hospital was reported by the Chiefs of Services.

Drs. Edward P. Richardson and James B. Ayer, respective chiefs of the West Surgical and Neurological Services, spoke of the newly opened surgical research and neurological ward, in the remodelled Bulfinch Building. Dr. Tracy B. Mallory, who has recently assumed his position as Pathologist, promised improved coöperation between the Pathological and Bacteriological and the clinical departments which will be rendered much more effective by the institution of the resident system. Dr. James H. Means told of the increased facilities of the Medical Service, both for the care of patients and for research, and described the new methods of teaching medical students now in vogue. Fourth year students now act as integral parts of the Services, and in addition have two mornings a week in the Out Patient Department.

Dr. Nathaniel Allison mentioned the improved service that the Orthopedic Department is rendering due to a more rapid turnover of patients, and commented on the benefit that will be gained by better pathological study of patients. Dr. Francis M. Rackemann reported on the Out Patient Department, with particular reference to the new system of visiting two days a week, and the inauguration of the appointment system for patients.

Luncheon was served as usual in the brick corridor. In the afternoon the usual custom of a formal program was departed from, and in its place was an informal tea with a general inspection of the hospital by the visitors.

The annual dinner of the Massachusetts General Hospital House Pupils' Alumni Association was held at the Union Club, Boston, in the evening.

The following officers were elected:

President—Dr. John W. Bartol.
1st Vice President—Dr. F. J. Cotton.
2nd Vice President—Dr. J. M. T. Finney.
3rd Vice President—Dr. E. G. Brackett.
Secretary-Treasurer—Dr. C. E. Wells.

The after-dinner speakers were Mr. George Wigglesworth, Chairman of the Board of Trustees, who spoke on the present needs and future plans of the hospital, and Dr. George H. Bigelow, State Commissioner of Health, who spoke on the Cancer Problem in Massachusetts.

CORRECTION

ON page 830 in our issue of October 21 under the heading "The Resignation of Dr. Lester H. Howard" the statement appears that certain groups of cattle owners have been distinctly polite. The word polite is not correct. The error was made by the stenographer. The statement should read certain groups of cattle owners have been distinctly *hostile*.

THE AWARDING OF THE HENRY J. BIGELOW MEDAL

THE Boston Surgical Society will confer the Henry J. Bigelow Medal to Dr. Rudolph Matas of New Orleans on November 1, 1926. The introduction will be made by Dr. C. A. Porter, President of the Society, and Dr. Harvey Cushing will present the medal. Dr. Matas will deliver an address on "The Spirit and Art of Surgery."

RECENT DEATHS

DODGE—DR. ARTHUR MALCOLM DODGE, former anesthetist of Boston, died at his home in Hampton Falls, N. H., October 17, 1926, aged 64.

Dr. Dodge was born at Hampton Falls, N. H., July 19, 1862, and had his education at the local schools and at Harvard Medical School, where he received his M.D., in 1899. He served as house officer at St. Elizabeth's Hospital, and began practice in Boston, soon moving to Newton Center. Of late years he had given exclusive attention to anesthesia, being a member of the Associated Anesthetists of the United States and Canada, and maintaining an office in Boston. Failing health caused his removal to his birthplace in New Hampshire, this last year.

UPHAM — DR. SAMUEL RICE UPHAM died at his home in Claremont, N. H., October 11, 1926.

He was born in the town October 9, 1861, the son of James Phineas and Elizabeth Rice Upham. He attended school at the Military Academy in Granville, N. Y., and was graduated from the Medical Department of the University of Vermont in 1888. He then studied at the College of Physicians and Surgeons in New York City, after which he served an internship as house physician and surgeon at the Rhode Island Hospital in Providence, and for several years practiced medicine in that city. Later he returned to his native town, where he had been engaged in the practice of his profession until a few weeks before his death.

During the World War he gave his services to the government in the examination of volunteers and drafted men in Sullivan County, N. H. He made a specialty of tuberculosis and was a recognized authority in western New Hampshire on this disease. He had been a trustee of the Tuberculosis Sanitarium at Glencliff, N. H., since its foundation, and, for several years past, chairman of the board of trustees.

He was a member of the Triton Club in Northern Quebec, where he spent several months every year shooting and fishing. He is survived by a widow, Marguerite Bailey Upham, and an adopted daughter, Patricia, also two brothers, J. Duncan Upham and George Baxter Upham, and a sister, Ruth Brewster Upham, all of Claremont, N. H.

NOTICE

INFORMATION WANTED

IF the whereabouts of Dr. J. F. Krasnye formerly of Keith's Theatre Building, Lowell, and 419 Boylston Street, Boston, is known, will the person in possession of said information please communicate with the BOSTON MEDICAL AND SURGICAL JOURNAL.

REPORTS AND NOTICES OF MEETINGS

CENSORS' MEETING

THE Censors of the Suffolk District Medical Society will meet for the examination of candidates at the Medical Library, No. 8 The Fenway, Thursday, November 4, 1926, at 4 o'clock.

Candidates should make personal application to the Secretary, and present their medical diploma at least one week before the examination.

ARTHUR H. CROSBIE, *Secretary.*
520 Commonwealth Avenue, Boston.

CENSORS MEETING

THE NORFOLK DISTRICT MEDICAL SOCIETY

THE Censors of the Norfolk District Medical Society will hold a meeting for the examination of candidates Thursday, November 4th, 1926, at 4 P. M., in the Roxbury Masonic Temple, 171 Warren Street, Roxbury.

Candidates should make application to the Secretary and present their diplomas or certificates of graduation to him for inspection at least one week previous to the date of examination. A fee of $8.00 is payable at the time of examination.

FRANK S. CRUICKSHANK, *Secretary.*

THE SECOND ANNUAL MEETING OF THE TRUDEAU SOCIETY

THE second annual meeting of the Trudeau Society will be held on November 11, 1926, at 8.15 P. M., in John Ware Hall, The Medical Library, The Fenway, Boston, Mass.

The address will be by Dr. Richard C. Cabot, his subject being "Tuberculosis, From the Standpoint of Clinic and Autopsy."

The business of the evening will be the reports, and election of officers and the election of candidates for membership.

GEORGE S. HILL, *Secretary-Treasurer.*

THE NORFOLK DISTRICT MEDICAL SOCIETY

A STATED meeting of the Norfolk District Medical Society was held at the Walker-Gordon Laboratory Farm, Charles River Village, Needham, Mass., October 26.

This meeting was made possible through the kindness of The Walker-Gordon Company that operates at Needham a strictly modern certified producing plant with a complete laboratory on the farm. Guides were furnished to conduct the members about the plant and to demonstrate

to them the methods of the scientific control of raw milk—controls which check the animal, the human handler and the final product. The inspection and meeting proved exceptionally interesting.

PROGRAM

4 P. M. Inspection.

6 P. M. Luncheon, followed by a short business meeting. Lantern-slide picture of the activities of the Plant.

We were fortunate in obtaining two prominent pediatricians to speak to us and were favored by their presentation of the following communications:

Prematurity, William W. Howell, M.D. The Modern Aspects of Infant Feeding, Martin J. English, M.D.

FRANK S. CRUICKSHANK, M.D., *Secretary*,
23 Bay State Road.

DORCHESTER MEDICAL SOCIETY

THE program of the regular meetings of the Dorchester Medical Society for the season of 1926-1927 to be held at the Municipal Building, Columbia Road, Dorchester, is as follows:

The first meeting was held October 20, 1926. Dr. Edward N. Libby spoke on the "Abdomen from Medical Standpoint."

Subsequent meetings will be held: November 17, 1926. Dr. William J. MacDonald, "Modern Methods of Treatment in Dermatology." Illustrated with lantern slides. December 15, 1926. Dr. Robert B. Greenough, talk on "Malignancy." January 19, 1927. Dr. Edwin H. Place, "Discussion on Contagious Diseases." (Topics to be discussed will be those by request of members, who will please send topics or questions to the secretary of the Dorchester Medical Society prior to the meeting, to be given to the speaker at this meeting.) February 16, 1927. Dr. Frank B. Granger, "Use and Abuse of Physio-therapy. March 16, 1927. Dr. Daniel F. Jones, "Present Status of Peptic Ulcer." April 20, 1927. Annual meeting. Supper at Chinese Restaurant. Talk by Dr. Edward J. Denning on "Diseases Found Among Chinese on Admission to the United States." Talk by Judge Lane of East Boston.

It is very desirable that we have a large attendance at these meetings as a mark of courtesy and appreciation to these men who so generously respond to our requests to give these talks. Please make a special effort to attend. Each member is invited to bring a guest. All members of the profession are cordially invited. All meetings start promptly at 8:30 p. m.

The telephone number of the Municipal Building is Dorchester 9615.

DR. B. THURBER GUILD, *President*
DR. HENRY L. FLYNN, *Secretary*

MASSACHUSETTS STATE NURSES' ASSOCIATION, INC.

SEASON 1926-1927

DR. CHANNING C. SIMMONS of Boston will address the members of Norfolk and Suffolk County Branches of the Association, October 28th at 8 o'clock, at 636 Beacon Street.

Subject: "The Control of Cancer and Campaign Inaugurated Under State Board of Health."

Business meeting after lecture.

All nurses welcome.

MARY ALICE MCMAHON, *Secretary*,
Boston State Hospital,
Boston 24, Mass.

MIDDLESEX SOUTH DISTRICT MEDICAL SOCIETY

CENSORS MEETING

THE censors for the Middlesex South District Medical Society will meet at the Colonial Club, 20 Quincy Street, Cambridge, for the purpose of examining applicants on Thursday, November 4, at 4 p. m.

STEPHEN M. BIDDLE, *Secretary*.

AMERICAN ACADEMY OF PHYSIOTHERAPY

THE New England Section of the American Academy of Physiotherapy will hold a meeting on Friday, October 29, at 8:00 p. m., Boston Medical Library, at which time papers will be given by Dr. Joseph Riviére of Paris on Physiotherapy in Dermatology and Dr. William Seaman Bainbridge of New York City on Some Primary Factors in Disease. The discussion will be opened by Dr. Byron Sprague Price of New York City. Members of the medical profession and their colleagues are invited to be present.

MEETINGS OF ESSEX SOUTH DISTRICT MEDICAL SOCIETY FOR 1926 AND 1927

Wednesday, November 3, 1926—Salem Hospital. Clinic, 5; supper, 7 P. M. Dr. Robert DeNormandie, "Toxaemis of Pregnancy." Discussion by Drs. Parkhurst of Beverly and Williams of Lynn. 10 minutes each.

Thursday, November 4, 1926—Censors meet for the examination of candidates at the Salem Hospital, 3.30 P. M.

Wednesday, December 1, 1926—Beverly Hospital. Clinic, 5; supper 7 P. M. Dr. Jason Mixter, "Diagnosis and Treatment of Cerebral Lesions." Discussion by Drs. Randall and McDermott of Salem. 10 minutes each.

Wednesday, January 5, 1927—Deer Cove Inn, Swampscott. Dr. James S. Stone, "Differential Diagnosis of Acute Abdominal Condi-

tions in Children." Discussion by Drs. O'Keefe of Lynn, Nichols of Danvers and Walter Phippen of Salem. 5 minutes each.

Wednesday, February 2, 1927—Hawthorne Hotel, Salem. Dr. H. H. Clute of the Lahey Clinic, "Differential Diagnosis and Treatment of Thyroid Disease." Discussion by Drs. Johnson of Beverly and Field of Salem. 10 minutes each.

Wednesday, March 2, 1927—Lynn Hospital. Clinic, 5; supper 7 P. M. Dr. George Minot, "Pernicious Anemia With Special Reference to Liver Diet." Discussion by Drs. Sargent of Salem and Reynolds of Danvers. 10 minutes each.

Wednesday, April 6, 1927—Danvers State Hospital. Clinic, 5 P. M. Dr. Allen W. Rowe. Subject to be announced, followed by dinner. Discussion by Drs. Wood of Hathorne and Kline of Beverly. 10 minutes each.

Thursday, May 5, 1927—Censors meet for examination of candidates at the Salem Hospital 3.30 P. M.

Wednesday, May 11, 1927—Annual meeting. The Tavern, Gloucester. Speaker and subject to be announced later.

GREATER BOSTON MEDICAL SOCIETY

THE next meeting of the Greater Boston Medical Society will be held on Nov. 2, 1926, at the Evans Memorial Auditorium.

The program for the evening: Symposium on Tuberculosis.

(1) "A Prevention of Tuberculosis by Vaccination." (The Method of Prof. Calmette.) Boris M. Fried, M.D.

(2) "Artificial Pneumothorax in the Treatment of Tuberculosis." Moses J. Stone, M.D.

(3) "Heliotherapy in Non-Pulmonary Tuberculosis." Arthur Thurman, M.D.

(4) "Gastro-Intestinal Aspects of Tuberculosis." Percy B. Davidson, M.D.

WORCESTER NORTH DISTRICT MEDICAL SOCIETY

THE regular quarterly meeting was held at Burbank Hospital, Tuesday, October 26th, at 4:30 P. M.

The speaker was Edwin H. Place, M.D., whose subject was "Recent Developments in the Control and Treatment of Contagious Diseases."

W. E. CURRIER, *Pres.* C. H. JENNINGS, *Sec'y*

HARVARD MEDICAL SOCIETY

THE next meeting of the Harvard Medical Society will be held Tuesday, November 2, at 8:15 P. M., in Amphitheatre of Building C, at the Harvard Medical School. The speaker of the evening will be Dr. Rudolph Matas of New Orleans, retiring president of the American College of Surgeons. His subject will be: "Surgical Treatment of Aneurysm." Moving pictures will be used to illustrate throughout. Members of the medical profession, medical students and nurses are cordially invited to attend.

JOINT MEETINGS OF THE SUFFOLK DISTRICT MEDICAL SOCIETY AND THE BOSTON MEDICAL LIBRARY

Meetings of the Suffolk District Medical Society and the Boston Medical Library will be held at the Boston Medical Library, 8 The Fenway, Boston, at 8:15 o'clock, as follows:

The first meeting was held October 27—"The Functions and Organization of the Boston Psychopathic Hospital," Dr. Charles Macfie Campbell, Director; "The Problems of Neurosyphilis as Dealt with at the Boston Psychopathic Hospital," Dr. Harry C. Solomon, Chief of the Department of Therapeutic Research; "The Out-Patient Department of the Boston Psychopathic Hospital and Its Relation to the Community," Dr. Marianna Taylor, Chief of the Out-Patient Department; "Initial Phases and Somatic Symptoms of Mental Disorders," Dr. Karl M. Bowman, Chief Medical Officer.

November 17, Surgical Section—"The Relation of the Urologist to the General Practitioner," Dr. Henry B. Bugbee, New York City.

December 15, Medical Section—"Diagnosis and Treatment of Scarlet Fever and Certain Aspects of Other Contagious Diseases," Dr. Edwin H. Place.

January 26, General Meeting in association with the Boston Medical Library—"Medical Work at the Metropolitan Life Insurance Company," Dr. Augustus I. Knight, Medical Director, Metropolitan Life Insurance Company.

February 23, Surgical Section—"Clinic on Neurological Cases at the Peter Bent Brigham Hospital," Dr. Harvey Cushing.

March 30, Medical Section—Subject and speaker to be announced later.

April 27. Annual Meeting. Election of Officers—"Medical Education in the Orient and Occident," Dr. David L. Edsall, Dean, Harvard Medical School.

The medical profession are cordially invited to attend all these meetings.

ELLIOTT P. JOSLIN, M.D., *President*,
Suffolk District Medical Society.
ARTHUR H. CROSBIE, M.D., *Secretary*,
Suffolk District Medical Society.
WILLIAM D. SMITH, M.D., *Chairman*,
Medical Section, Suffolk District Medical Society.
ROBERT C. COCHRANE, M.D., *Chairman*,
Surgical Section, Suffolk District Medical Society.
MALCOLM STORER, M.D.,
Boston Medical Library.

BOOK REVIEW

Studies from the Rockefeller Institute for Medical Research. Reprints. Vol. LVI. 1926.

This volume is made up of forty-six reprints representing the recent contributions to medical literature made by workers at the Institute or financed by its grants elsewhere. As usual, the articles are grouped under various headings ranging from chemistry to animal pathology and deal with practically every brand of medical science. The two articles most interesting to clinicians are those of Rous, "The Biliary Aspects of Liver Disease" and Swift, "Rheumatic Fever."